

ROYAL BOTANIC GARDENS, KEW.

## BULLETIN

OF

## MISCELLANEOUS INFORMATION.

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### XVII.—SOME ADDITIONAL SPECIES OF MECONOPSIS.

(With Plates.)

In 1894 the writer had to undertake the task of arranging the material of the natural family *Papaveraceae* communicated by various collectors to the herbarium at Calcutta subsequent to the revision of the Indian species published by Sir Joseph Hooker in 1872.\* This material included several previously uncharacterised forms of *Meconopsis*, one of which is so distinctive that it was possible to provide a description at once.† In the case of the others, relationship with various described species was manifest; the publication of these was therefore deferred till they could be compared with certain types in other herbaria, notably Kew and Paris. While in Paris in 1895 the writer received much help from the late Mr. Franchet, who, with great kindness, deferred the work on which he was engaged, in order that he might take part in a critical comparison of the Himalayan with the Chinese species of this genus. The results of this study were published in 1896.‡

Ten years later the writer was asked to prepare a digest, intended primarily for the information of cultivators, of the known species. This digest was issued in 1906.§ It had hardly appeared before its incompleteness was demonstrated by the communication of material of a new form from South-Western China, which was published in 1907.|| Later in the same year it was necessary to describe yet another new species ¶ from the same general area.

\* Flora of British India, vol. i, pp. 116-119.

† Journal of the Asiatic Society of Bengal, vol. lxiii. part 2, p. 82.

‡ Journal of the Asiatic Society of Bengal, vol. lxiv. part 2, pp. 309-321.

§ Annals of Botany, vol. xx. pp. 323-367.

|| Transactions and Proceedings of the Botanical Society of Edinburgh, vol. xxiii. p. 258.

¶ Kew Bulletin, 1907, p. 316.

Two years afterwards the genus *Meconopsis* was dealt with by Dr. F. Fedde in the *Pflanzenreich*.<sup>\*</sup> This authoritative revision, though published in 1909, does not bring our knowledge of the species beyond 1906; from a footnote under the key to the species it seems possible that the monograph in the *Pflanzenreich* had, except as regards that key, been completed before the paper in the *Annals of Botany* appeared.

Some difference of judgment in two independent revisions is inevitable. The more important in this case may be mentioned. In the *Pflanzenreich* it is suggested that *Cathcartia*, Hook. f., should perhaps be included in *Meconopsis*; the reduction has not, however, been effected. In the *Pflanzenreich*, too, the sections of the digest in the *Annals of Botany* are treated as subgenera, while the groups of allied species indicated in the same place are treated as sections. In one case, what was considered in the digest of 1906 to be a variety appears to be advanced in the *Pflanzenreich* to the position of a species; and in a particular instance a critical specimen issued by Wallich in 1830 without a specific name has been included in one species by Dr. Fedde, in another by the writer.

During the decade 1894-1904 the interest taken by cultivators in the genus *Meconopsis* had been mainly confined to the Himalayan forms. About 1903 a number of Chinese ones previously unknown in gardens were introduced, and the old interest in certain Indian species became transformed into something approaching enthusiasm for the genus as a whole. This enthusiasm is largely responsible for the marked increase in our knowledge of the genus which has taken place during the decade 1904-14. The revisions of 1906 embody the first-fruits of that enthusiasm, but the time has already come for a succinct statement of the results which have attended further observation in the field and further experience in the garden. Some conception of what has happened may be gathered from the circumstance that whereas the number of species known in 1896 was 23 and in 1906 was 27, this number is now 40,† whilst at least one very striking hybrid form has been artificially raised.‡ As a consequence, it is necessary once more to provide a key to the species, for the assistance especially of those engaged in their cultivation.

Before doing this, however, some reference is called for to the suggestion of Dr. Fedde that *Meconopsis* and *Cathcartia* might, perhaps, be united. There is much to be said in favour of the suggestion, and there is more to be urged on its behalf now than there was in 1909.

The difficulties which attend the delimitation of genera in *Panaveraceae* are well-known; a single concrete illustration may suffice. Bentham and Hooker, in the *Genera Plantarum*, have

\* Das Pflanzenreich, 40 Heft [IV. 104], pp. 247-271.

† This is exclusive of three species which, both in the *Pflanzenreich* and in the *Annals of Botany*, are included in *Cathcartia*, and of at least one, perhaps two more, known from incomplete material collected by Captain F. M. Bailey, which have come to hand while this paper was passing through the press, and are here treated tentatively under two known forms.

‡ Gardeners' Chronicle, 1911, vol. l. p. 22, fig. 14.



adduced reasons for the belief that *Hylomecon*, Maxim., and *Dicranostigma*, Hook. f. & Thoms., may conveniently be included in *Stylophorum*, Nutt. In the *Pflanzenreich* all three are once more regarded as distinct genera. The relationship to each other of *Papaver*, Linn., *Meconopsis*, Vig., and *Cathcartia*, Hook. f., resembles that which subsists between the other three genera mentioned. The afterthought which has led Dr. Fedde to refrain from formally including *Cathcartia* in *Meconopsis* thus has the advantage of according similar treatment to two parallel groups of types.

When Viguiér, in 1814,\* first segregated *Meconopsis* from *Papaver*, in which it had been included by Linnaeus, he did so because the ovary of *Meconopsis* has a style but no apical disk. The latter consideration was from the first a subordinate one, because certain species of *Papaver* in which there is no proper disk were already known. Now, we have become acquainted with species of *Meconopsis* which possess a well-developed apical disk, and with others in which the style is obsolete. So completely have the individual characters originally relied upon for the discrimination of these two genera broken down, that one competent authority has formally reunited *Meconopsis* with *Papaver*.† Nevertheless, by the use of the salient differential characters in combination, instead of individually, it is still possible to keep *Meconopsis* and *Papaver* apart.

When Hooker in 1851 first established the genus *Cathcartia*‡ its separation from *Meconopsis* was easy. No *Meconopsis* then known has a sessile or sub-sessile stigma; every *Meconopsis* then known has a capsule which opens when ripe only by short apical valves like those of every *Papaver* in which the capsule is dehiscent at all. The most striking difference between the species on which the genus *Meconopsis* was based and that which constitutes the type of the genus *Cathcartia* is met with in their stigmas. The stigma of that *Meconopsis* is clavate with decurrent sub-contiguous rays; the stigma of the original *Cathcartia* is depressed with stellately divaricate rays situated on the margins of compressed laminae. This *Cathcartia* stigma is comparable with the *Papaver* disk; the difference between the two is that in *Cathcartia* the disk segments are plicate, in *Papaver* they are explanate. From the first, however, this difference in stigma was a subordinate feature in the diagnosis of *Cathcartia* from *Meconopsis*. The latter genus already included a species, *M. simplicifolia*, with a stigma of the *Cathcartia* type,§ though at the apex of a distinct style in place of subsessile as in *Cathcartia villosa*. Now, other five species of *Meconopsis* are known to possess such a disk as occurs in *Cathcartia*; two of these have a style like that of *M. simplicifolia*, the other three have no style. In 1876 one of the three in which the stigma is sessile was, when first described,

\* Hist. Pav. Diss. p. 20.

† Greene in Pittonia, vol. i. p. 168.

‡ Botanical Magazine, t. 4596.

§ For an excellent series of drawings in which the salient features of a stigma of this type are well shown, see Gardeners' Chronicle, 1905, vol. xxxvii. fig. 121 on p. 291.

placed in *Cathcartia* by Maximowicz as *C. integrifolia*.\* A decade later another of the three was tentatively referred to *Cathcartia* by the same author.† But in these two species the dehiscence of the capsule is confined to apical chinks and does not take place, as in *C. villosa*, by the separation of the valves from the placental ribs throughout their length. This circumstance induced Franchet in 1886‡ to refer *M. integrifolia* to *Meconopsis* rather than to *Cathcartia*, and in this action Franchet was followed as regards both plants by Maximowicz in 1889.§ This subordination of the character derived from the stigma to that afforded by the valvular dehiscence induced Franchet in 1886|| to refer two species with stigmas of the original *Meconopsis* type to the genus *Cathcartia*. The expectation that in these species, *M. Delavayi* and *M. lancifolia*, the valves of the ripe capsules might be fissile throughout was not fully realised, and in 1895 Franchet transferred both from *Cathcartia* to *Meconopsis*.¶ But Maximowicz and Franchet are not the only authors whose judgment has been influenced by the original decision that the crucial diagnostic character in the case of these two genera is to be found in the degree of separation which takes place in respect of the valves of the capsule. The segregation of the genera by Bentham and Hooker in 1862\*\* again depends mainly on this character, and in 1876, when Maximowicz was describing *Cathcartia integrifolia*, Regel placed in *Meconopsis* another species in which the stigma is like that of *Cathcartia villosa*.†† Since 1886 the experience of others has been the same; in 1889 the dehiscence character was relied on by Prantl and Kundig ‡‡, and in 1895 the same character induced Cummins and the writer to repeat what had been done by Franchet in 1886 as regards a species with a distinct style and a clavate stigma.§§ In this last case, however, the action was not based on the expectation, but was taken with the knowledge that in the species concerned the ripe capsules have valves which may separate from the placental ribs throughout their length. This particular plant, *C. lyrata*, in Dr. Fedde's opinion, may equally well be regarded as a *Meconopsis*.||| The experience of the past twelve months has gone far to justify the soundness of this view.

The fruits of *M. Forrestii*, a species of the group *Primulinae* described in 1907, have now been communicated; so have those of *M. Delavayi*. In both cases they prove to be long and cylindric like those of the species which Fedde has renamed *M. lyrata*. They are larger than the capsules of *M. lyrata*, and those of *M.*

\* Bull. Acad. Pétersb. vol. xxiii. p. 310.

† Flora Tangutica, t. 23, on which the name *Cathcartia punicea* is inscribed.

‡ Bull. Soc. Bot. Fr. vol. xxxiii. p. 389.

§ Flora Tangutica, text at pp. 34, 35.

|| Bull. Soc. Bot. Fr. vol. xxxviii. pp. 390, 391.

¶ Journal of the Asiatic Society of Bengal, vol. lxiv. part 2, p. 311.

\*\* Genera Plantarum, vol. i. pp. 50, 52.

†† Gartenflora, vol. xxv. p. 291, t. 880 where, however, the figure given is inexact, in that it shows the stigma as subtended by a style.

‡‡ Die Natürlichen Pflanzenfamilien, vol. iii. part 2, p. 141.

§§ Journal of the Asiatic Society of Bengal, vol. lxiv. part 2, p. 325.

||| Das Pflanzenreich, 40 Heft [IV. 104], p. 216.



*Forrestii* have hardly any style. But size is not an important feature, while the difference as regards style, as the cases of *M. integrifolia* and *M. pseudointegrifolia*, and again, of *M. chelidoniifolia* and *M. Oliveriana* have shown us, need not be of more than specific importance.\* Moreover, two new members of the group *Bellae* have been reported in which the capsules are again long and cylindric, but have well-developed styles like that of *M. lyrata*. Among the species of *Meconopsis* with long cylindric capsules, we find in *M. Oliveriana* a case in which the fruit opens by the short apical valves of a typical *Meconopsis* or a true *Papaver*. But in *M. Forrestii*, *M. Delavayi*, *M. venusta*, and *M. concinna*, the extent to which the valves separate is considerably greater, and these four forms thus supply conditions intermediate between those that occur in *M. Oliveriana* and in *M. lyrata*. The dehiscence character, therefore, turns out to be a relative, not an absolute one; while it may still prove of value for specific discrimination, it no longer remains effective as a distinction between allied genera.

When the dehiscence character was believed to be of generic significance—and until direct evidence that it had broken down was available there was no good reason for questioning this belief—the treatment accorded to the genera *Meconopsis* and *Cathcartia* in the *Pflanzenreich* was inevitable. Now that the inadequacy of this character is manifest the general position must be reviewed, and the first consequence of the altered situation must be the transfer of the section *Cumminsia* from *Cathcartia* to *Meconopsis*. This transfer effected, we have next to consider whether the section *Eucathcartia* should also be transferred to *Meconopsis*. In arriving at a conclusion, it is necessary to estimate the value of the character afforded by the *Cathcartia* stigma.

We have seen that this character was accorded generic significance by Maximowicz in 1876, and the fact that after 1886 Maximowicz waived his opinion in deference to the judgment of Franchet, does not necessarily prove that the view held in 1876 was erroneous. Franchet's judgment of 1886 was induced by the fact that when ripe fruits of *Cathcartia integrifolia* became known they were found to open only by apical valves. It was therefore based upon the earlier judgment of Hooker which, in 1886, there was no reason to doubt. Now that it is known that the dehiscence character is, at best, of no greater value than the stigmatic character, it is permissible to enquire whether the latter criterion can be adopted in substitution of the former. The recognition of a genus *Cathcartia*, enlarged as Maximowicz, in effect, suggested in 1876 that it should be, would involve the transfer to the original *Cathcartia* of the group *Grandes*, in which the stigma agrees with that of *Cathcartia*, as a compensation for the removal of the section *Cumminsia*, which agrees with *Cathcartia* as regards dehiscence. This, however, we know now to be im-

\* In the case of *M. integrifolia* and *M. pseudointegrifolia*, an interesting and prolonged discussion which took place in the *Gardeners' Chronicle* in 1905-6, and was revived in 1911, has testified to a disposition in some quarters to doubt whether the presence or absence of a style be even of specific consequence.

possible. Since 1876 two species unknown to Maximowicz, which constitute the group *Chelidonifoliae*, have been reported from China. The peculiarity of these two species is that as regards root, stem, leaves, and all parts of the flower save the pistil, the two plants are not merely similar, but identical. Yet the pistil of one is globose and has a style with a clavate stigma like that of *M. cambrica*, while the other has a long cylindric pistil with no style, but has a depressed sessile stigma like that of *Cathcartia villosa*. The stigmatic character in this group therefore possesses no greater value than the dehiscence character in some of the other groups.

The objection to the use of either the dehiscence character or the stigmatic one singly does not preclude the simultaneous use of the two. There is no species of *Meconopsis* with a stigma like that of *Cathcartia villosa*, in which the valves of the capsule become separated from the placental ribs beyond the point at which these ribs began to converge to the base of the style. It is, therefore, still easy to keep up the genus *Cathcartia* for the original type *C. villosa*. One practical advantage which attends the adoption of this course, rather than the acceptance of the suggestion made in the *Pflanzenreich*, is that it leaves unchanged a name which is familiar in European gardens. But the knowledge gained from a study of the material communicated since 1909 makes it necessary to modify somewhat the statement of the characters of the genus *Meconopsis*.

**MECONOPSIS**, Vig. *Sepals* 2. *Petals* 4, or 5-9. *Stamens* usually  $\infty$ , several-seriate, rarely under 20 and few-seriate. *Stigma* usually 4-6-lobed, rarely 2-3-lobed, terminal on a distinct or occasionally obsolete style, usually capitate or clavate with decurrent almost or quite contiguous rays, less often depressed with stellately divaricate rays on the upper margins of compressed laminae. *Capsule* usually ovoid or oblong opening by the separation of the apices of the valves from the converging upper portions of the placental ribs, less often narrow-cylindric and then sometimes with the valves separating in part or entirely from the lateral parallel portions of the placental ribs.—Herbs with simple or racemiform cymose scapes, or with simple or branching leafy stems, usually monocarpic and biennial, very rarely annual, occasionally polycarpic or perennial. Leaves usually entire or sub-entire, less often lobed or dissected, glabrous or beset with simple or barbellate hairs or setae or prickles.

In addition to the three species—two East Himalayan and one Western Chinese—of the section *Cumminsia* now transferred from *Cathcartia* to *Meconopsis*, a further increase of thirteen species—one North-Western Himalayan, three East Himalayan, and nine Western Chinese—has taken place since 1906. Two of these species were described in 1907; the remaining eleven are described below.

The accession of these thirteen new species does not affect the sub-division of the genus into the two sections proposed in 1906, viz., *Eumeconopsis*, in which the plants, if not wholly glabrous, are beset with simple hairs, setae or prickles; and *Polychaetia*, the



members of which are more or less hirsute with barbellate hairs or setae. Within each of the sections it is still desirable to recognise a number of groups of closely allied species. In *Eumecopsis* these groups are:—1, *Anomala*, which stand alone in the genus in having distinctly ocellate and slightly zygomorphic flowers, and in being annual plants; 2, *Cambricae*, perennial with glabrous leaves, yellow or orange flowers and branching stems; 3, *Cumminsia*, perennials with hirsute leaves and blue or purple flowers; 4, *Decorae*, a new group, with aculeate basal leaves, but only hirsute stem-leaves, and with the lowest flowers on the stem in cymules; 5, *Aculeatae*, with all the flowers on simple pedicels or peduncles and with all parts beset with pungent prickles; 6, *Primulinae*, with usually entire or sub-entire glabrous, hirsute or setose leaves, and flowers in racemose cymes or on simple scapes, but when on simple scapes with 7–8 petals; 7, *Bellae*, with dissected, lobulate or very rarely entire leaves and with flowers always on simple scapes and always 4-petalous or casually 5-petalous. In all the members of the section *Eumecopsis* the stigma is capitate or clavate with decurrent subcontiguous rays. In the section *Polychaetia* there are but four groups:—8, *Grandes*, with scapose stems or with solitary flowers on simple scapes and with a depressed stigma with stellately divaricate rays; 9, *Torquatae*, with scapose stems and a well-developed disk on the top of the capsule at the base of the style; 10, *Robustae*, with a tall, usually branching stem central to a crown of leaves which precedes its evolution; this crown does not die away during the winter; and 11, *Chelidoniifoliae*, with slender branching stems, lobed leaves and perennial rootstocks.

These groups proposed in 1906 as aggregates of nearly allied forms, with the object of facilitating the recognition by the field-botanist and the cultivator of plants with which they might have occasion to deal, have been advanced in the *Pflanzenreich* to the rank of sections, while the sections of 1906 have in turn been treated as sub-genera. When treated as sections, the groups are open to the criticism that the line of demarcation between them does not always appear to be a natural one. In the *Pflanzenreich* exception is taken more especially to the segregation of the *Aculeatae* from the *Primulinae*. If this criticism be just it applies with even greater force to the segregation of the *Primulinae* from the *Bellae*. It has, however, to be borne in mind that, as originally proposed, the groups represent aggregates, not segregates, and as there is reason to believe that they have to some extent served the purpose for which they were intended, their use is continued here as aggregates, not as sections.

The experience of the past twenty years indicates that, in twenty-two per cent. of the species, the petals are yellow with variation in shade on the one hand to ivory-white and on the other to orange; or, in seventy-eight per cent. of the species, are blue, with variation in shade on the one hand to indigo or violet and on the other to purple or red. In the yellow-flowered series the range of variation is, as a rule, slight within the limits of individual species; in the blue-flowered series the range of variation within specific limits is often considerable, and it is noticeable

that the tendency to vary is at times less marked in species near the extreme limits of this range, such as the violet *M. Henrici*, the indigo *M. horridula*, the purple *M. quintuplinervia*, and the red *M. punicea*, than it is among species like *M. aculeata*, *M. rudis*, *M. Prattii*, *M. Wallichii*, where the normal colour is pale blue. But with all this variation there is no instance, so far as is at present known, of a species in which the petals are sometimes yellow, at others blue or purple or red.

In 1896 it was pointed out that in *M. primulina* the stigma, which is of the type with decurrent rays, is 2-partite, the lobes being oblong and plano-convex, the outer convex surface being 2-rayed. It was further pointed out that in this species there is a rudimentary disk composed of four papillae in two pairs, each pair opposite to the stigmatic cleft. It is now known that this solution of the stigma is not peculiar to *M. primulina*. It is sometimes, though not always, met with in the flowers of *M. discigera*, where again there is a disk. In this case, however, the solution may be complete, the individual stigmatic rays or loops being quite discrete and stellately patent; as before, the disk-lobes are alternate with the stigmatic rays or loops. There is, however, no necessary connection between this tendency to solution of the stigmatic rays and the presence of a disk or a rudiment of that structure. A tendency to solution has been met with in *M. psilonomma* from Kansu; and in a specimen of *M. speciosa*, collected by Forrest in 1914 in Yunnan (Forrest n. 13240), the stigmatic rays in some of the flowers are as completely separated as in the case of *M. discigera*, though, owing to the fact that the stigma in *M. speciosa* is considerably shorter than it is in *M. discigera*, the appearance which the discrete rays present is less striking.

In 1906 it was necessary to explain that of the alpine vegetation of the Himalayan region and of the Tibetan districts to the north, between 89° and 99° E, practically nothing was then known.\* One of the sequels to the Abor Expedition of 1911-12† was the organisation of a systematic survey of the Abor country proper and of the region to the north of the country inhabited by the Abor tribes. This survey included in its scope the exploration of the catchment area of the Dibong, an affluent of the Brahmaputra,‡ and while this was in progress two of the officers employed, Captain Morshead and Captain Bailey, were detached from the main party, and, travelling with very light equipment, were able to traverse the ranges in the district of Chindro which separate the valley of the Dibong from that of the Dihong, the large river, which debouches next to the west from the Himalaya into the Assam plain. It seems probable that it was in the course of this journey that seeds of a *Meconopsis* "from the Abor country," raised in Greenwich Park in 1914, were obtained. From one of these plants, which flowered in June, came the material upon which the description provided below of the striking species *M. decora* has been based. Subsequently the

\* Annals of Botany, vol. xx. p. 330.

† Kew Bulletin, 1912, p. 159.

‡ Geographical Journal, vol. lxii. p. 491.



same two officers were deputed to investigate the course of the Dihong and to verify its identity with the river known in Tibet as the Tsang-po.\* In the course of this journey Captain Bailey was able to secure a few fragmentary botanical specimens and some ripe seeds. The specimens include four species of *Meconopsis*, all of them distinct from the one raised in 1914 in Greenwich Park. Two of the four were collected in July, 1913, in the upper Rong-chu Valley, in the extreme east of the province of Kongbo in South-Eastern Tibet, between the 94° and 95° meridians. The other two were obtained in September, 1913, near the 92° meridian, in the district of Tawang, in the Tibetan province of Monyul. The district in which these September specimens were collected, though politically Tibetan, belongs geographically to the Himalayan region, and bears to the country inhabited by the Akha tribes approximately the relationship which Chimdro bears to that in which the Abors dwell. All four differ from every species of *Meconopsis* hitherto recognised by certain well-marked characters, but, having regard to the meagre and incomplete nature of the material available, it has been thought preferable for the moment to exclude two of them from our key to the species and to refer to them, as varieties, under the two fully-known species to which they seem respectively most nearly allied. The remaining two, despite the imperfect nature of the specimens, exhibit, however, features so distinctive that there is no room for doubt as to their claim to specific rank or for uncertainty as to their position in the genus. So far only one species of *Meconopsis* raised from seed obtained by Capt. Bailey during this journey has flowered. The seed was gathered on Pen-la, 17,000 ft.; the plants raised prove to belong to the Nepalese and Sikkim species, *M. simplicifolia*.

#### KEY TO THE KNOWN SPECIES OF MECONOPSIS.

\*Leaves glabrous or with simple hairs, setae, or prickles; stigma clavate, its rays decurrent and close-set [p. 141]:—

+Stem-leaves as large as or larger than the radical leaves; petals 4 [p. 138]:—

Flowers somewhat zygomorphic, brick-red with a deep purple eye; annuals:—

Stem-leaves shorter than the internodes; capsule narrow, 4-5-valved ... .. 1. *heterophylla*.

Stem-leaves longer than the internodes; capsule broader, 6-10-valved ... .. 2. *crassifolia*.

Flowers actinomorphic; perennials:—

Flowers yellow or orange; leaves pinnatifid, glabrous or nearly so 3. *cambrica*.

\* Geographical Journal, vol. xlv. pp. 341-360, with map.

- Flowers blue or purple; leaves hirsute:—
- Leaves hastate entire, or lyrate-pinnatifid ... .. 4. *lyrata*.
- Leaves ovate-lanceolate, more or less incised-crenate:—
- Petals ovate-lanceolate, acute; stamens 16 ... .. 6. *polygonoides*.
- Petals rounded, obtuse; stamens 64 ... .. 6. *betonicifolia*.
- † Stem-leaves, if any, smaller than the radical leaves; monocarpic, usually biennials [p. 137]:—
- Flowers white, the lowermost in 2-flowered cymules; radical leaves prickly, cauline unarmed ... .. 7. *decora*.
- Flowers blue or purple or violet, in raceme-like cymes or on simple scapes, never paniculate:—
- ‡ Plants armed throughout with pungent prickles [p. 139]:—
- Scapes stem-like, leafy below; flowers, except the uppermost, subtended by leafy bracts:—
- Petals 4; stigma capitate:—
- Capsule fusiform:—
- Leaves pinnatipartite to pinnatisect; stigma pale green ... .. 8. *aculeata*.
- Leaves incised-crenate or incised-serrate; stigma purple or orange ... .. 9. *latifolia*.
- Capsule long-obconic; leaves sinuately lobed ... .. 10. *sinuata*.
- Petals 6-8; stigma clavate:—
- Leaves pinnately partite; bracts under the pedicels few and small ... .. 11. *speciosa*.
- Leaves subentire or sparingly toothed:—
- Prickles pale; pedicels usually short; anthers white or pale buff-coloured ... .. 12. *Prattii*.
- Prickles usually purple at base or throughout; pedicels long; anthers orange ... .. 13. *rudis*.
- Scapes simple radical or accompanied or replaced by pseudostems of agglutinated scapes, leafless or with 1-3 upraised



- leaves or bracts under the lowest flowers; anthers yellow 14. *horridula*.
- ‡ Plants glabrous or hirsute or setose not prickly [p. 138]:—
- Scapes with several ebracteate flowers in a raceme-like cyme; leaves entire or subentire; monocarpic, biennials:—
- Style almost obsolete; capsule narrow - cylindric; leaves linear-oblancoate ... 15. *Forrestii*.
- Style well developed:—
- Petals 4, or\* casually 5; bluish-purple; anthers dull yellow; capsule narrow; leaves linear-oblancoate (in this species the central compound scape is sometimes accompanied by radical simple scapes) ... 16. *lancifolia*.
- Petals 7-8:—
- Petals deep blue; anthers pale buff or grey:—
- Leaves ovate-lanceolate; capsule narrow ... 17. *lepida*.
- Leaves linear-oblancoate; capsule ovate ... 18. *eximia*.
- Petals violet-purple; anthers bright yellow; leaves linear-oblancoate; capsule subpyriform (in this species the scapes are usually simple) ... 19. *Henrici*.
- Scapes simple, each with a solitary flower:—
- § Petals 7-8; leaves linear-oblancoate; monocarpic, biennials [p. 140]:—
- Petals blue or purple; leaves entire or subentire:—
- Petals violet-purple; anthers bright yellow; scapes several (see above) ... 19. *Henrici*.
- Petals deep blue; anthers grey or pale buff:—
- Scapes several ... 20. *primulina*.
- Scape always central, solitary, tall, stout.. 21. *pilonomma*.
- Petals white; leaves subruinate; anthers yellow 22. *argemonantha*.

§ Petals 4, or casually 5; blue  
or purple [p. 139]:—

Scapes several to many from  
each crown:—

Ovary densely setose ... 23. *Baileyi*.

Ovary sparingly setose or  
glabrous:—

Capsule much widened  
under the base of  
the style; rootstock  
long, simple:—

Leaves shortly lobu-  
late, ovate-lanceo-  
late; capsule long-  
obconic; petals  
deep blue; mono-  
carpic, biennial 24. *impedita*.

Leaves twice pinnati-  
sect; capsule  
ovate; petals light  
blue; polycarpic.. 25. *bella*.

Capsule narrow-cylin-  
dric:—

Leaves runcinate, lobes  
3-7-jugate, ovate  
or lanceolate, or  
the outermost,  
rarely all the  
leaves entire, ob-  
ovate-lanceolate;  
rootstock short,  
tuberous, several-  
lobed; anthers  
grey; ? monocar-  
pic, biennial ... 26. *concinna*.

Leaves once pinnati-  
sect, lobes 1-2-  
jugate, orbicular  
or wide-oblong, or  
the outermost,  
rarely all the  
leaves entire,  
spathulate-oblong;  
rootstock long,  
simple; anthers  
orange; polycar-  
pic ... 27. *venusta*.

Scapes solitary or sub-solitary  
from each crown; leaves  
all entire or subentire,  
spathulate-oblong; root-  
stock long, simple; poly-  
carpic ... 28. *Delavayi*.



\*Leaves more or less hirsute with barbellate hairs [p. 137]:—

Stems simple and scapose, or 0; leaves mostly or all radical, subentire:—

Capsule without a disk; stigma depressed, its rays stellate-divaricate:—

Flowers yellow, petals 5-8; monocarpic, biennials:—

Style 0 ... .. 29. *integrifolia*.

Style distinct ... .. 30. *pseudointegrifolia*.

Flowers blue or purple or scarlet:—

Style distinct; petals 5-8:—

Stem scapose; flowers blue or purple; polycarpic ... .. 31. *grandis*.

Stem 0; flowers blue; monocarpic, biennial ... .. 32. *simplicifolia*.

Style 0; petals 4:—

Flowers purple; polycarpic ... .. 33. *quintuplinervia*.

Flowers scarlet; monocarpic, biennial ... .. 34. *punicea*.

Capsule with a flat disk round base of style; stigma clavate, its rays decurrent and close-set; petals 4; polycarpic:—

Petals pale pink; lobes of disk entire; style very short ... .. 35. *torquata*.

Petals yellow; lobes of disk incised; style long ... .. 36. *discigera*.

Stems branched; radical leaves lobed or pinnatifid; stem-leaves numerous:—

Stems robust; flowers usually in panicles of cymules; monocarpic, biennials:—

Capsule ovate, 8-11-valved:—

Flowers white; stem-leaves incised-toothed ... .. 37. *superba*.

Flowers yellow:—

Stem-leaves incised-toothed ... .. 38. *paniculata*.

Stem-leaves pinnatifid ... .. 39. *robusta*.

Capsule oblong, 5-7-valved; stem-leaves pinnatifid:—

Leaves setose but not persistently puberulous ... .. 40. *napaulensis*.

Leaves both setose and puberulous ... .. 41. *Wallichii*.

Stems slender; flowers small, yellow, cymose; perennials:—

Capsule ovate; style distinct; stigma clavate, its rays decurrent and close-set ... .. 42. *chelidonifolia*.

Capsule narrow-cylindric; style  
 obsolete; stigma depressed, its  
 rays stellate-divaricate ... 43. *Oliveriana*.

§ EUMECONOPSIS, Prain in Ann. Bot. vol. xx. p. 343 (sect.); Fedde in Pflanzenr. IV. 104, p. 248 (subgen.).

1. ANOMALAE, Prain, l.c., p. 344; Fedde, l.c., p. 253 (sect.).

1. **Meconopsis heterophylla**, Benth.: Irving in Gard. Chron. 1906, vol. xl. p. 23; Fedde, l.c., fig. 33 F-H (1909); Mottet in Rev. Hort. 1912, p. 203; Gard. Chron. 1914, vol. lv. p. 18, fig. 10.

A writer in the *Gardeners' Chronicle* for 1914 terms *M. heterophylla* the only American species of *Meconopsis*, thus repeating a statement made in the same journal on July 14, 1906. The actual state of affairs was explained in the *Annals of Botany* in October, 1906. The statement repeated in 1914 may be correct, but from the evidence available, all that can yet be said is that *M. heterophylla* is the only American *Meconopsis* to be met with in European gardens.

2. **Meconopsis crassifolia**, Benth.: Fedde, l.c., p. 255, fig. 33 J, K (1909).

In addition to being not merely monocarpic but annual plants, the members of the *Anomala* group differ from those of the other groups in having slightly zygomorphic flowers. For this reason it seems desirable to take them out of the position in the sequence of groups suggested in 1906.

2. CAMBRICAE, Prain, l.c., p. 343; Fedde, l.c., p. 251 (sect.).

3. **Meconopsis cambrica**, Vig.: Fedde, l.c., fig. 34 A, B (1909); Mottet in Rev. Hort. 1912, p. 203; Fitzherb. in Gard. Chron. 1913, vol. liv. p. 52, fig. 26.

3. CUMMINSIA, Prain, l.c., p. 368 (sect. sub *Cathcartiam*); Fedde, l.c., p. 245. Inermes; perennantes; caules elongati, foliosi, simplices vel ramosi; folia inciso-crenata vel lyrato-pinnatifida, sparse hirsuta; sepala fere glabra; flores purpurei vel coerulei petalis 4; styli distincti; capsula glabra, sensim in stylum attenuata.

4. **Meconopsis lyrata**, Fedde, l.c., p. 246 (1909).—*Cathcartia lyrata*, Prain, l.c., p. 369; Fedde, l.c., p. 246, fig. 33 E; Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 172 (1911); Smith, l.c., p. 348 (1913).

Additional material of this species, in flower, was communicated in 1913 to the Royal Botanic Garden, Edinburgh, from Sikkim; Phedup, 13,000 ft., *Romoo* 1120. It has further been collected at Nachegeh, 15,000 ft.; also at Karponang, Sherabathang and in the Dichu Valley, 9000-13,000 ft., *Smith* 3168, 3758, 4308. Plants have not yet, however, been raised in European gardens.



5. **Meconopsis polygonoides**, Prain.—*Cathcartia polygonoides*, Prain l.c.; Fedde, l.c., p. 246, fig. 33 l.

6. **Meconopsis betonicifolia**, Franch. Pl. Delavay., p. 42, t. 12 (1889).—*Cathcartia betonicifolia*, Prain, l.c.; Fedde, l.c., p. 245, fig. 33 d.

The necessity for the transfer of this group of species from *Cathcartia* to *Meconopsis* has already been explained. It stands next to the *Cambricae* with which it agrees in having slender stems with petioled stem-leaves, and in having perennial root-stocks; it differs in having sparingly hairy leaves, blue or purple flowers, and long, slender, ripe capsules, in which, in the only species where the ripe fruit is known, the dehiscence is not confined to the apex of the valves.

4. **DECORAE**, Prain. Armatae quoad folia radicalia, ceterum inermes; caulis evolutus simplex; folia radicalia pinnatifida, caulina inciso-serrata; sepala setosa; flores albi petalis 4-6; styli distincti; capsula dense setosa, sensim in stylum attenuata.

7. **Meconopsis decora**, Prain; species ob folia radicalia *Aculeatas*, ob flores saltem inferiores cymulosim dispositos *Robustas* in memoriam reducens; ab his tamen pilis simplicibus ab illis stylo elongato gracili ovarioque haud aculeato longe recedens.

*Herba* plus minusve hirsuta. *Caulis* evolutus. *Folia* radicalia pauca, ambitu ovato-oblonga, acuta, basi late cuneata, pinnatipartita segmentis falcato-oblongis iterum e latere convexo lobulatis, longe petiolata, utrinque aculeis pungentibus armata, 5 cm. longa, 2.5 cm. lata; petiolus 4 cm. longus, aculeis patentibus armatus. *Folia* caulina anguste oblonga vel oblongo-lanceolata, acuta, basi truncata, margine inciso-serrata, sessilia, utrinque setis vel pilis flexuosis induta, 3.5-6 cm. longa, 1.5-2 cm. lata, cymulas 2-floras vel versus apicem caulis flores singulos subtendentia. *Flores* pedicellati pedicellis gracilibus subflexuosis 4-6 cm. longis setis subpatentibus vestitis; cymulae utriusque junior ex axilla bractee ovato-oblongae acutae margine lobulatae 1.5 cm. longae 1 cm. latae ortus. *Sepala* 2, ovata, extra retrorso-setosa. *Petala* 4-6, oblonga, alba, glabra. *Stamina*  $\infty$ , pluri-seriata, filamentis albis discretis glabris; antherae aureae. *Ovarium* e carpellis 4-6 compositum, subglobosum, setis albis simplicibus dense indutum; stylus gracilis elongatus; stigma breve clavatum lobis decurrentibus contiguus purpurascens; placentae intrusae; ovula plurima. *Capsula* adhuc ignota.

**EASTERN HIMALAYA:** Chindro; mountains between the Dibong and Dihong Rivers, *Bailey*.

The account here given of this interesting species has been based on material communicated to Kew on 8 June, 1914, from a living plant in the collection at Greenwich Park, where it had been raised by Mr. T. Hay from seed collected by Captain F. M. Bailey. This seed is said to have come from the Abor Country, and Mr. Hay on raising plants had supposed them to belong to *M. aculeata*; when flowers appeared he took the form to

be a white-flowered variety of that species. It is, however, in reality so distinct that it is advisable to treat it as the type of a separate group.

5. *ACULEATAE*, Prain, l.c., p. 346; Fedde, l.c., p. 255 (sect.).

8. ***Meconopsis aculeata***, Royle: Fedde, l.c., fig. 35 N (1909); Mottet in Rev. Hort. 1912, p. 203.

var. **typica**; caules erecti simplices, raro basi 2-3 adscendentes, 30-60 cm. alti; rhizoma simplex crassum dauciforme, radicibus gracilibus perpaucis ornatum.

NORTH-WEST HIMALAYA: In every district from Hazára to Kamaon.

var. **nana**, Prain; caules erecti simplices, 10-15 cm. alti; rhizoma gracile radices graciles dense caespitosas emittens.

NORTH-WEST HIMALAYA: Chamba, 9000 ft., *Beresford*.

This species is the familiar 'Prickly Blue Poppy of Kashmir' of our gardens, and it is unusual to find plants with petals other than sky-blue. Yet in neither of the coloured figures of the species which have been published so far is the usual colour shown; that by Royle (Ill. Bot. Him. t. 15) has red petals; that by Hooker (Bot. Mag. t. 5456) has purple flowers. In connection with the latter illustration, Sir William Hooker has suggested that the colour in Royle's figure may be erroneous, and may be due to the figure having been made from a herbarium specimen. That this is not necessarily the explanation has been now ascertained. In May, 1908, a plant of *M. aculeata* with flowers of the same colour and very nearly the same shade as those of Royle's picture blossomed in the collection at Kew. This red colour is, however, evidently rare as compared with the purple of Hooker's figure, while the latter is itself uncommon; of all the species with normally sky-blue petals *M. aculeata* and its ally *M. latifolia* are the two which in cultivated plants show the least tendency to vary. It has been noted that whatever the colour of the petals may be the filaments in *M. aculeata* are the same, though, as in the other normally sky-blue species, the shade may be rather deeper. It has also been noted that whatever the colour of the petals and filaments may be, the stigma in *M. aculeata* is always pale green.

The figure of *M. Gulielmi-Waldemari*, given by Klotzsch (Bot. Ergebn. Waldem. Reise, t. 36) shows a plant with several slender ascending stems in place of the solitary stem characteristic of *M. aculeata*. This condition, for it is no more, of *M. aculeata* seems to be unusual. It has not been met with in cultivated plants, and no one appears to have noticed it in the field since Hofmeister collected the specimen figured by Klotzsch. Among the many earlier gatherings of *M. aculeata* examined, only one example of this condition with several stems has been seen. This specimen was collected by Strachey and Winterbottom, at Niti, in Garhwal, at 11,000 ft., along with the ordinary condition. The appearance of that specimen suggests the possibility of some injury to the crown prior to the commencement of the flowering season's growth.



The examination of a large series of specimens makes it possible to separate off two recognisable forms within typical *M. aculeata*. These may be termed:—*a normalis*, with obtuse or rounded subacute leaf-segments and almost always short pedicels, under 2 in. long; and  $\beta$  *acutiloba*, with the leaf-segments triangular in place of ovate, and almost always long pedicels, 4–8 in. long, with in this case also at times a number of simple radical scapes accompanying the central stem. The two characters, shape of leaf-segment and length of pedicel, do not, however, run absolutely concurrently; that afforded by the pedicels will be remarked upon later in another connection. The form  $\beta$  *acutiloba* is comparatively rare.

Professor Balfour has observed that in the Edinburgh Alpine Garden *M. aculeata* develops simple radical scapes in addition to a central stem more readily in early shooting individuals than in late, a circumstance which has suggested a possible temperature check of the terminal scape. This suggestion is supported by the fact that destruction of the terminal scape in the course of the flowering season's growth always results in the production of profuse basal laterals.

The form indicated above as var. *nana*, which is also apparently rare, is on a different footing. It can be readily distinguished from any form or condition of typical *M. aculeata*, not only on account of its small size, but by having a slender rootstock which breaks up into a tufted mass of fibrous roots, which replace the stout vertically descending carrot-like stock characteristic of the type. The earliest record of this dwarf variety is afforded by a specimen at Kew which flowered at Longford Bridge in July, 1865; beyond the fact that it reached Longford Bridge from the Liverpool Botanic Garden nothing is known of the history of this particular plant, which has hitherto been accepted as a stunted example of typical *M. aculeata*. Recently, however, more light has been thrown upon this form. In 1907 some seeds were sent to Kew by Lieut. G. D. Beresford, 10th Lancers, then stationed at Jullunder in the Panjab, with the note:—"Seeds of small Blue Poppy gathered in Chamba region (Himalaya); flowers light blue; found growing at an elevation of 9000 ft. and upwards in damp shady nallas, frequently in ground that has been covered with snow till fairly late in the year." Biennial like the type, the plants raised from these seeds flowered at Kew late in June, 1909, all the plants of the batch being from 3–5 in. high, and having a tuft of fibrous roots in place of the thick rootstock of typical *M. aculeata*. The reduction in size extends in this variety to the capsule and the seeds: the stigma is pale green, as in *M. aculeata* proper.

Instances of deviation from the normal 4-petalous condition, though not unknown in *M. aculeata*, are rare. In a case noted in June, 1909, there was only one abnormal flower on the plant. In this flower there were eight petals, four normally disposed, and other four considerably smaller, constituting an inner whorl again disposed in two pairs exactly like the outer four. Their nature was suggested by the circumstance that there was one

perfect stamen, which arose from the receptacle outside the point of origin of one of the petals forming the outer pair of the inner series.

Hitherto, in passages dealing with this species, Kashmir has been given as its westmost limit of distribution. It is now known that it extends further west into Hazára, where it has been gathered at Makra, Kagán, at 13,000 ft., by collectors employed by the Saharanpur Botanic Garden. It has not, however, been met with west of the Indus Valley, and it has now to be remarked that it does not extend to the north of the mountains of Kashmir proper. It would appear from the *Pflanzenreich* that there is in the herbarium at Berlin a specimen of *M. aculeata* distributed from Kew in 1864 as No. 117 Herb. Falconer, which was collected in Garhwal. No specimen of *M. aculeata* brought to Saharanpur from Garhwal by Dr. Falconer's native collectors has been retained in the herbarium at Kew; all the specimens there included under the Kew distribution number 117 were collected either on the mountains that surround the valley of Kashmir or in the passes to the north of and outside Kashmir proper. They represent the following original field numbers in Herb. Falconer:—1384; 1418/2; 3015/2; 3039; 3191/2. All the Kashmir specimens in question belong to typical *M. aculeata*, Royle; none of those from the passes to the north of Kashmir belong to *M. aculeata*. The form to which the latter belong is one that until 1908 had been consistently included in Royle's species, to which it is indeed closely allied but from which it is better kept distinct.

9. **Meconopsis latifolia**, Prain; species *M. sinuatae*, Prain, et *M. aculeatae*, Royle, quam maxime accedens; ab hac foliis haud pinnatisectis stigmatisque colore ab illa foliis margine incisis nec sinuatis capsulaque breviora facillime distinguenda.

*Herba* armata. *Caulis* evolutus, simplex, 1–1.25 cm. altus. *Folia* radicalia ambitu ovato-oblonga vel oblonga, apice obtusa, basi cuneata, margine grosse inciso-crenata vel inciso-serrata, longe petiolata, supra viridia, subtus glaucescentia, utrinque aculeis pungentibus obsita, 15–18 cm. longa, 4–5 cm. lata; petiolus 5–6 cm. longus. *Folia* caulina basalibus similia sed gradatim minora, 8–15 cm. longa, 3–4 cm. lata, petiolis gradatim brevioribus summis bracteis proximis subobsoletis. *Flores* in cymas racemiformes dispositi; pedicelli 2–6 cm. longi, aculeati, bracteati; bractea foliis conformes nisi minores, sessiles. *Sepala* 2, ovata, extra parcius aculeata. *Petala* 4, ovato-rotundata, saepe subcuspidata, 3 cm. longa, 2.75 cm. lata, clare coerulea. *Stamina* ∞, pluri-seriata, filamentis intense coeruleis discretis glabris; antherae aureae. *Ovarium* e carpellis 4 compositum, ovoideum, aculeis pungentibus densius indutum; stylus elongatus; stigma capitatum lobis decurrentibus confugis purpureis vel casu aurantiacis; placentae intrusae; ovula plurima. *Capsula* subfusiformis, 2.5–2.75 cm. longa.—*M. sinuata*, Irving in Gard. Chron. 1908, vol. xlv. p. 202, fig. 88; vix Prain. *M. sinuata*, var. *latifolia*, Prain in Bot. Mag. t. 8223 (1908); Kew Bull. 1909, app. 3, p. 95. *M. aculeata*, Smith in Gard. Chron. 1909, vol. xlv. p. 91, figs. 38, 39; nec Royle.

NORTHERN KASHMIR: Gurais Pass, 12,000 ft., *Winterbottom* 493; Tragbol, 10,500 ft., *Clarke* 29299; passes north of Kashmir, *Falconer* 3139, 3191/2; *Appleton*.

The late Mr. C. B. Clarke, during a journey made by him in 1876 through Kashmir as far as the Karakoram Range,\* met with *M. aculeata*, Royle, at Palgam, 13,000 ft., on September 4 (*Clarke* n. 31057), and in the Marbul Pass, 10,500 ft., on September 15 (*Clarke* n. 31291). The plant now described as *M. latifolia* he collected at Tragbol, 10,500 ft., on July 20 (*Clarke* n. 29299). To him belongs the credit of having been the first to note in the field that this plant differs from *M. aculeata*, Royle, as that species has been defined, though he never formally published this view, and his specimens at Kew show that at a later date he acquiesced in its reduction to *M. aculeata*. Clarke, however, was not the first collector of this plant. It had been obtained on two separate occasions, as long ago as 1838, to the north of Kashmir, by native collectors employed by Dr. H. Falconer, then in charge of the Botanic Garden at Saharanpur, and it was collected again, on the Gurais Pass at 12,000 ft., by Mr. J. E. Winterbottom on June 20, 1847 (*Winterbottom* n. 498). Winterbottom's plant was accepted by Hooker and Thomson in 1855 as a form of *M. aculeata*, Royle,† and, like Clarke, the writer was content in 1896 and again in 1906 to accept this identification as correct.

The introduction of *M. latifolia* to cultivation has, however, afforded an opportunity of comparing it with *M. aculeata* in the living state, and has led to the conclusion that Clarke's original view is probably correct. This introduction we owe to Lieut.-Col. Appleton, R.E., who, writing from Lucknow on 7th January, 1906, advised the despatch "of a small bottle (sealed) containing mature seeds of the blue Kashmir poppy, which I do not remember to have noticed in the Kew or Edinburgh Alpine gardens. It grows generally at 10,000 to 13,000 ft. elevation and has the habit of a Saxifrage, that is, it is always found growing in the crevices of rocks or among loose piles of stone debris on stone slides and below cliffs. It likes the full sun, and springs to full growth after the snow melts off, while the ground is still damp."

Knowing how careful an observer Col. Appleton is, and remembering that *M. aculeata* had been in continuous cultivation both at Kew and at Edinburgh for at least half a century, especial attention was paid to this seed. The supply being fortunately ample, in addition to sowing a quantity at Kew, packets were distributed to the Botanical Gardens at Edinburgh, Glasnevin, Oxford and Cambridge, and exchanged with Messrs. J. Veitch and Sons and the Messrs. Bees. The seed was issued from Kew as *M. aculeata*?, but when the plants raised from the seeds sown in 1906 came into flower in 1908, it was pointed out both by Mr. W. Irving at Kew and by the Messrs. Veitch at Coombe Wood that they belonged to a species distinct from *M. aculeata*. The judgment of observers so experienced and

\* Kew Bulletin, 1906, p. 273.

† Flora Indica, vol. i. p. 253.



competent was not to be lightly set aside, and their reasons for refusing to treat Col. Appleton's plant as a form of *M. aculeata* were, in fact, incontrovertible. Ripe capsules, however, were not for the moment available, so that when the plant was figured in the Botanical Magazine in 1908 the writer, while removing it from *M. aculeata*, refrained from according it the rank of a species, but treated it instead as a variety of *M. sinuata*, between which and *M. aculeata* it stands, as regards foliage, in an intermediate position.\* Now, however, that its ripe capsules are known, it is evident that *M. latifolia* cannot be included in *M. sinuata*, and the only alternative is to accord it the status of a species apart.

10. ***Meconopsis sinuata***, Prain: Fedde, l.c., p. 256, fig. 35 o (1909); Smith, Rec. Bot. Surv. India, vol. iv. p. 347 (1913).

This has been collected again in Sikkim, at Changu, 13,000 ft., Smith n. 3147, but has not yet found its way into European gardens.

11. ***Meconopsis speciosa***, Prain in Trans. Proc. Bot. Soc. Edin., vol. xxiii. p. 258, t. 2 (1907); Forrest in Gard. Chron. 1911, vol. 1. p. 51.

This species has been met with a second time in South-western China by Mr. F. K. Ward, whose specimens (Ward n. 817) agree exactly with the original specimens communicated by Mr. G. Forrest, who has collected it again on the Mekong-Salwin Divide in Yunnan, in 1914 (Forrest n. 13,240). It has not yet flowered in European gardens, nor has it been taken up in the *Pflanzenreich*.

12. ***Meconopsis Prattii***, Prain in Bot. Mag. sub t. 8568 [nomen] (1914) et in Bot. Mag. t. 8619 (1915); species e grege *Aculeatarum* proxime *M. sinuatae*, Prain accedens et olim eacum conjuncta, sed foliis subintegrifolius petalis numerosioribus capsulaque oblonga nec longe obconica facillime sejungenda.

*Herba* armata, monocarpica, biennis. *Rhizoma* anguste dauciforme, elongatum. *Caulis* evolutus, simplex, 3·5–7·5 dm. altus. *Folia* radicalia basaliaque late lanceolata, apice acuta, basi sensim in petiolum attenuata, margine subintegra raro versus basin paucidentata, supra pallide viridia, subtus etiam pallidiora, utrinque aculeis pungentibus obsita, 10–15 cm. longa, 2·5–3 cm. lata; petiolus 6–8 cm. longus. *Folia* caulina basalibus similia sed gradatim minora, 6–14 cm. longa, 2–2·5 cm. lata, petiolis gradatim brevioribus summis bracteis proximis subobsoletis. *Flores* in cymam racemiformem dispositi, interdum etiam pauci in pedunculos simplices circa basin caulis enatos additi; pedicelli saepissime 1–2 cm., nonnunquam 3–4 cm., rarissime 10 cm. longi, aculeati, summis exceptis bracteati; bractee foliis conformes nisi minores, sessiles. *Sepala* 2, oblongo-ovata, extra aculeata. *Petala* 6–8, oblonga, obtusa, 2·25–2·5 cm. longa, clare coerulea vel pur-

\* Even in this respect, however, *M. latifolia* differs equally from both, for in *M. aculeata* and *M. sinuata* the sinuses between the lobes of the leaf are rounded, whereas in *M. latifolia* the sinuses are acute.

pureo suffusa vel raro pallide purpurea. *Stamina*  $\infty$ , pluri-seriata, filamentis intense coeruleis discretis glabris; antherae albae vel gilvae. *Ovarium* e carpellis 4 compositum, ovoideum, aculeis pungentibus densius indutum; stylus elongatus; stigma clavatum, lobis decurrentibus contiguis pallide virescentibus; placentae intrusae; ovula plurima. *Capsula* oblonga, 1.25 cm. longa.—*M. sinuata*, var. *Prattii*, Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2, p. 314 (1896). *M. rudis*, Prain in Ann. Bot. vol. xx. p. 347, syn. *M. horridula*, var. *rudis* excl. (1906); Farrer in Gard. Chron. 1914, vol. lvi. p. 318, et 1915, vol. lvii. p. 110. *M. Wardii*, Farrer, l.c. 1915, vol. lvii. p. 110 [nomen]. *M. racemosa*, Fedde, l.c., p. 258, pro parte et quoad fig. 35 m (1909); T. Smith in Gard. Chron. 1909, vol. xlv. p. 91, fig. 40; Wilson, Western China, vol. i. p. 138 (1913); nec Maxim.

WESTERN CHINA: West Kansu; Sien-wha-shan, 11,000 ft., *Purdum* 736; Peling Range, 13,000 ft. (form with long-pedicelled flowers and with simple basal scapes accompanying the stem), *Purdum*. Western Szechuan; near Ta-chien-lu, 13,000–15,000 ft., *Soulié* 635; *Pratt* 525; *Wilson* 3162; *Ward* 762, 891: Mupine, 14,000 ft., *Wilson* 3030. North-western Yunnan; A-tun-si, 13,000 ft., *Forrest*; Chung-tien Plateau, 12,000–14,000 ft., *Forrest*, 12664, 12834; Mekong-Yangtse Divide, Kari Pass, 13,000 ft., *Forrest*, 13021.

This species, then known only from specimens collected by Pratt, was treated by the writer in 1896 as a variety of *M. sinuata*, which it greatly resembles in habit, but from which it differs in having the leaves subentire and acute. The fuller material available in 1906 showed that it further differs as regards number of petals, 6–8 in place of 4, and as regards shape of capsule, oblong in place of long-obconic. It was therefore removed from *M. sinuata* and treated as an integral portion of *M. rudis*, with which it agrees in number of petals, in length of style, and in shape of capsule, when that species itself was being removed from *M. horridula*, to which it had been referred as a variety in 1896. But on his return from his Chinese journey of 1908, Mr. E. H. Wilson, who, with the kind permission of Professor Sargent of the Arnold Arboretum, had paid particular attention on the writer's behalf to the genus *Meconopsis* in the field, subjected the treatment of 1906 to useful criticism. Mr. Wilson was in a position to show that the removal of *M. rudis* from *M. horridula*, effected in 1906, was essential. He had for the first time been able to collect this species himself on the uplands of Pan-lan-shan, west of Kuan-hsien, at 14,000 ft., in June, 1908, in flower, meeting with it again in the same neighbourhood in August in fruit, and collecting it again both in fruit and in flower, also in August, in the mountains to the north of Mupine, at 12,000–13,000 ft. At the same time, however, he had to point out that *M. sinuata*, var. *Prattii*, as originally defined in 1896, is even more distinct from *M. rudis* than the latter is from *M. horridula*. Mr. Wilson was already well acquainted with *M. sinuata*, var. *Prattii*, which he had collected on cliffs near Ta-chien-lu, at 15,000 ft. in July, 1914 (*Wilson* 3162), and was able to refresh his memory as to its appearance by meeting with

the plant again among rocks in Mupine, at 14,000 ft., in July, 1908 (*Wilson* 3030). In 1913, in his work on Western China, Mr. Wilson, while maintaining the view that *M. Prattii* is distinct from *M. rudis*, has accepted the *Pflanzenreich* arrangement and has referred both the Ta-chien-lu and Mupine *M. Prattii* (vol. i. p. 138), and the form of *M. horridula* collected by him on the higher alps of Western Szechuan (vol. ii. p. 9) to *M. racemosa*, Maxim.

Since 1908 both *M. Prattii* and *M. rudis* have been in cultivation in European gardens; observation of the two in the living state has fully confirmed the justice of Mr. Wilson's criticism. Though nearly allied, the two differ considerably in the consistence of their leaves, those of *M. Prattii* being softer in texture and of a different shade of green; in their prickles, which in *M. Prattii* are weaker and are always pale in colour, those of *M. rudis* usually being purple, at least at the base; in the anthers, which are whitish or buff-coloured in *M. Prattii*, yellow in *M. rudis*; and in the stigma, which in *M. Prattii* is greenish white, but in *M. rudis* is orange. The style, too, in *M. Prattii* is more slender, while the stigma is smaller than in *M. rudis*. Another difference between *M. Prattii* and *M. rudis* has impressed cultivators of these two species. In the former plant all the pedicels except the terminal one which supports the flower that opens first are short or very short, thus imparting a relatively compact appearance to the inflorescence; in the latter all the pedicels are long or very long and the inflorescence is therefore more open and lax. But this difference, though sufficiently striking to deserve notice, is not one on which too great stress should be laid. Within *M. aculeata* we find the same striking difference in appearance, yet in that species no great account has been, or can be, taken of the character. Moreover, there is evidence that the same variability is manifested in *M. Prattii*. The specimens collected by Mr. Purdom at Sien-wha-shan, in West Kansu (*Purdom* 736), are not distinguishable from the original type of *M. Prattii* from near Ta-chien-lu, in West Szechuan. But the plant met with by the same collector on the Peling Range has all the stem pedicels very long, exactly as in the corresponding condition of *M. aculeata*, Royle, and has, moreover, what is rather rare in *M. aculeata*, a considerable number of long, slender, 1-flowered, simple radical scapes surrounding the base of the central stem. In this instance, too, the character would appear to be a fixed one, for in a plant presented to Kew by the late Mr. R. Woodward, junior, who had raised it at Arley Castle from seed of this Peling Range form, the character of long stem-pedicels with accompanying radical simple scapes is as marked as in the original specimen.

13. **Meconopsis rudis**, Prain in Bot. Mag. t. 8568 (1914).—*M. racemosa*, Franch. in Bull. Soc. Bot. Fr., vol. xxxiii. p. 38 (1886) et in Pl. Delavay., p. 41 (1889); nec Maxim. *M. horridula*, var. *rudis*, Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2. p. 314 (1896). *M. rudis*, Prain in Ann. Bot. vol. xx. p. 347, syn. *M. sinuata*, var. *Prattii* excl. (1906); Fedde, l.c. p. 256, syn. *M. sinuata*, var. *Prattii* excl. (1909).



WESTERN CHINA: Yunnan; Likiang Range at Sui-chen, *Delavay*; Mekong-Salwin Divide, 14,000 ft., *Forrest* 13233. Western Szechuan; mountains north of Mupine, 12,000-13,000 ft., *Wilson* 951; Pan-lan-shan, west of Kuan-hsien, 14,000 ft., *Wilson* 951A.

In *M. rudis* we find the same degree of variation in colour of petals, from sky blue to blue suffused with pink or purple and to pale purple, that is occasionally met with in *M. aculeata* and is so common a feature in *M. Prattii*. The relationship which *M. rudis* bears to *M. Prattii* has already been discussed. Its closest affinity, however, is with *M. horridula*, of which it was treated as a variety in 1896. In *M. horridula* the petals are usually of a deep dark blue colour, but even of that species it has been noted in the field that pale blue flowers occur. In both *M. rudis* and *M. horridula* the anthers are deep yellow, and the most outstanding difference between the two lies in the style, which is twice as long in *M. rudis* as it is in *M. horridula*.

In *M. rudis* the stem, which is leafy below but has only a few of the lower stem-pedicels bracteate, is accompanied, in all the wild specimens seen, by a number of simple, 1-flowered, radical scapes.

There is a field note associated with a specimen of *M. lancifolia* (*Forrest* n. 469) communicated by Mr. G. Forrest to the Edinburgh Herbarium, which suggests that he may have seen *M. rudis* on the Mekong-Salwin Divide between Lat. 27° and 27° 30' N in July or August, 1905; he has, indeed, since then, collected the species there. There is, however, no specimen with that note, and there is some ground for doubt owing to the fact that the plant referred to by Forrest occurs at about 9000 ft. elevation—as low down as *M. aculeata*, var. *nana* comes in the Panjab Himalaya. As we have not, from Western China, specimens of any member of the groups *Aculeatae* and *Primulinae* from so low an elevation as 9000 ft., it is not impossible that we may expect an as yet unknown species of *Meconopsis* from this region.

The same seems to be even more probable with regard to the Eastern Himalaya. During the Tsang-po Expedition of Captain Bailey and Captain Morshead, the first-named officer collected, on 18 September, 1913, at Potrang, 14,200 ft., a locality near the Pö-la, 91° 58' W, 27° 55' N, flowers of a *Meconopsis* belonging to the series of species of the *Aculeatae* group in which the flowers are 6-8-petalous. At the same time, this form has the short subcapitate stigma characteristic of the series of species, within the same group, in which the flowers are normally 4-petalous. It further appears to have simple 1-flowered scapes as in the "typical" condition of *M. horridula*. No leaves were collected. Except as regards the stigma, it comes nearest to *M. speciosa* and *M. rudis*, and for the moment it may best be regarded as a variety of the latter species.

var. *intermedia*, Prain; forma scapis ut videtur more *M. horridulae* simplicibus floribus nisi stigmatibus more *M. sinuatae* et *M. aculeatae* aequae longo latoque *M. rudem* et *M. speciosam* in memoriam reducens.

EASTERN HIMALAYA: Monyul; Tawang district at Potrang, 14,200 ft., *Bailey* 2.

14. **Meconopsis horridula**, Hook. f. & Thoms.; Fedde, l.c. p. 257, fig. 35 K, L (1909); Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 171 (1911); Smith, l.c., p. 347 (1913).

Var. **typica**; scapi omnes radicales, simplices, 1-flori.

TIBET: Eastern provinces; Kon-chin-la, 14,500–15,000 ft., *Przewalski*. Central provinces; Koko-chili, 35°–37° N, 85°–93° E, *Sven Hedin*; 35° 20' N, 92° E, 16,000 ft., *Wellby & Malcolm*; Amdo, 32°–33° N, 91° E, *Bower & Thorold* 134; Gooring Valley; 30° 12' N, 90° 25' E, 16,500 ft., *Littledale*; without precise locality, *Rockhill*. Southern provinces; Lhasa, 12,000 ft., *Waddell*; Karo-la, 16,500 ft., *Walton*; Khambajong, 15,800–17,500 ft., *Prain*; Gyantse, *Bailey*; Bomtso, *Hooker*; between Phari and Shigatse, *King's collectors*.

EASTERN HIMALAYA: Sikkim; Kongra-lama, 14,000 ft., *Hooker*; Kan-ko-la, 15,000 ft., *Gammie*; Donkia-la, 14,000–15,000 ft., *Gammie, Cummins*; Llonakh, 15,000–16,000 ft., *Smith & Cave* 2015; Chola, Gaoring, 14,000–16,000 ft., *Smith* 3990. Chumbi; Te-ling, *Dungboo*.

WESTERN CHINA: West Szechuan; between Batang and Tachien-lu, 16,000 ft., *Hosie*.

Var. **racemosa**, Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2, p. 313 (1896); Smith in Rec. Bot. Surv. India, vol. iv. p. 347 (1913); scapi nonnulli vel omnes in cymam racemiformem floribus omnibus ebracteis vel 1–2, raro 3, prope basin bracteatis agglutinati.—*M. racemosa*, Maxim.: Bulley in Gard. Chron., 1905, vol. xxxvii. p. 397; Garden, 1905, vol. lxxviii. p. 384, cum icon.; Fedde, l.c., p. 258 (1909) pro parte maxima; Mottet in Rev. Hort. 1912, p. 205; Wilson, Western China, vol. ii. p. 9 (1913). *M. horridula* var. *abnormis*, Fedde, l.c. (1909).

TIBET: Central provinces; Amdo, 32°–33° N, 91° E, *Potanin*. Southern provinces; hills above Lhasa, 14,000 ft., *Walton*; Khambajong, 15,800 ft., *Prain*; between Phari and Shigatse, *King's collectors*.

EASTERN HIMALAYA: Sikkim; Kan-ko-la, 14,000 ft., *Hooker*; Tan-kra-la, *Gammie*; Ta-ne-gang, Gia-gong and near Cho-la, *King's collectors*; Lachung, *Dungboo*; Ningbil, 14,000–15,000 ft., *Smith* 4077. Chumbi; Ta-chey-kung, *King's collectors*.

WESTERN CHINA: West Szechuan; between Batang and Tachien-lu, 14,000–16,500 ft., *Hosie*, *Wilson* 3163. North Szechuan; without precise locality, *Potanin*. West Kansu; Ta-tung Range, near Chobsen, *Przewalski* (*fide* Maximowicz).

In the species of *Aculeatae* so far discussed the stem—in reality, a compound scape—may have all the pedicels short or very short, or may have them long or very long; occasionally, when the pedicels are very long, the base of the central compound scape is surrounded by a number of long, slender, simple scapes, situated in the axils of the radical leaves. In *M. latifolia*, *M. sinuata* and *M. speciosa* only short stem-pedicels occur, and no specimens with simple radical scapes have been met with. In

*M. aculeata* the stem-pedicels are usually short, less often long; when the pedicels are long, occasionally there are a few simple basal scapes as well. In *M. Prattii* one instance—and that a recurring one—of the condition with long pedicels and simple basal scapes in addition to the central stem has been recorded. In *M. rudis*, on the other hand, the condition with a central stem and short pedicels has not been met with; all the specimens seen have long stem-pedicels, with, in addition, simple scapes round the base of the stem. In *M. horridula* we meet, for the first time, a further development. In the state of this species which has to be regarded technically as “typical,” because of its being the state to which the original diagnosis of the species alone applies, there is no central stem—or compound scape—at all; the scapes are all simple, 1-flowered and radical. Growing side by side with the plants in which all the scapes are radical we find others agreeing with the simple-scaped plants in every respect save in having a central stem with long pedicels in addition to a number of simple scapes; these agree in habit, though not in foliage, nor as regards their style, with *M. rudis*. Along with these plants we find growing still others, exactly the same as regards leaf and flower and fruit, but with short-pedicelled flowers on the main-scape, usually, though not always, all ebracteate, and usually, though not always, without any accompanying simple and solitary-flowered basal scapes. That all three states are conditions of the same natural species is, in the writer’s opinion, hardly open to discussion. It was felt convenient, however, in 1896 to recognise two varieties within the species. The first of these varieties was made to include only those specimens in which all the scapes are simple and have solitary flowers; the second to include all those specimens which have a compound scape, whether accompanied or not by simple basal scapes. The reason for the recognition of the first variety was a two-fold one. On the one hand, this variety corresponds precisely with what was described in 1855 as *M. horridula*, and what had for forty years been accepted as *M. horridula*; on the other hand, the character by which the variety may be recognised seemed then to be unique within the group *Aculeatae*, to which *M. horridula* belongs. The ground for the treatment of the remaining states of *M. horridula* as one variety, and not as two or more varieties, was that, although the same degree of variation is manifested within the limits of typical *M. aculeata*, in the case of that species this variability had not given rise to a necessity for the segregation of taxonomic varieties.

In the *Pflanzenreich* a somewhat different view has been taken. The treatment there accorded to what is technically the typical variety of *M. horridula* is identical with that proposed in 1896 and continued in 1906. The treatment accorded to what in 1896 and again in 1906 was recognised as var. *racemosa* is, however, modified in the *Pflanzenreich* in two respects. In the first place the state in which the central compound scape is accompanied by a number of simple basal scapes, is separated, to some extent, from the state in which the central compound scape has no accompanying basal scapes; further, only the former of these



two states is treated as referable to *M. horridula*, the latter being considered a distinct species.

So far as concerns that portion of var. *racemosa*, as defined in 1896, which, in the *Pflanzenreich*, has been left in *M. horridula*, another difference of opinion has been expressed. It is suggested in the *Pflanzenreich* that this state, which is there treated as a variety of *M. horridula*, may be merely an abnormal condition of a plant in which normally all the scapes are simple. In 1906, on the other hand, the opinion was expressed that it is the racemose condition which is normal, and that the condition which for technical reasons we are under the necessity of describing as the "typical" form is a reduced condition. The evidence available since 1906 has tended to confirm this view. Seeds, accompanied by specimens, have on several occasions since then reached this country from the neighbourhood of Gyantse and elsewhere in southern Tibet. These specimens have always been referable to typical *M. horridula* because they have always had only simple 1-flowered scapes. But no one has so far been able to raise a plant with simple 1-flowered scapes; the plants raised have always formed central stems with raceme-like cymes of ebracteate flowers, and have been treated by cultivators as belonging to *M. racemosa*, Maxim.

Regarding the general question as to whether the state in which all the scapes are simple and radical can be kept apart from either of the two states in which there is a central raceme-like compound scape, it has to be noted that even in Tibet, where the form with only simple scapes is the most common of the three, forms with raceme-like scapes have been met with in the Eastern portion of that table-land at Kon-chin-la, in the central portion in Amdo, and in the southern portion near Lhasa. On the high alps of Sikkim and Chumbi, where *M. horridula* extends through the passes from Tibet to the southern face of the Himalayas, all three states occur, but it is the state in which there are only simple 1-flowered scapes which is now least common. In the corresponding area in Batang and in Western and Northern Szechuan, where again, notwithstanding a doubt expressed in the *Pflanzenreich*, the species overflows from Tibet, we find both of the states which in that work are left in *M. horridula*, but it is the state which is distinguished by Dr. Fedde as *M. horridula*, var. *abnormis* which is the more usual of the two. The difficulty met with in distinguishing between this latter state and the state to which the name *M. racemosa* is restricted in the *Pflanzenreich*, is enhanced by the inclusion in that work, under *M. racemosa*, of one specimen, collected by Potanin in Northern Szechuan, in which the base of the stem is surrounded by a number of simple scapes situated in the axils of the radical leaves. The gathering of which this specimen forms part was issued by Maximowicz himself as *M. racemosa*, so that it is clear that, by its author, *M. racemosa* was held to include both the state described in the *Pflanzenreich* as *M. racemosa* and that described there as *M. horridula* var. *abnormis*. Nor is this all. The specimens at Kew, collected at Kon-chin-la in Eastern Tibet by Przewalski, which were issued by Maximowicz as *M. racemosa*, have no central

stem; all the scapes are simple and 1-flowered, and the specimens are identical with "typical" *M. horridula*, as originally defined by Hooker and Thomson, and as collected in Tibet by Wellby, Thorold, Littledale, Rockhill, Sven Hedin, Walton and others. It therefore seems clear that although Maximowicz in 1876 based his original diagnosis of *M. racemosa* on specimens with a central compound scape, he laid as little stress ultimately upon this character as did Hooker and Thomson, who had before them in 1855, when their original diagnosis of *M. horridula* was published, specimens with a central stem, collected by Hooker himself at Kan-ko-la in Sikkim on August 22, 1849. Since in both cases the same species was in question, and in both cases the range of variation in habit was equally well known, the question arises why in 1889 Maximowicz still considered *M. racemosa* to be specifically different from *M. horridula*. The answer is supplied by Maximowicz himself; in *M. racemosa*, as Maximowicz was aware, there are always more than four petals, whereas by implication Hooker and Thomson suggest that in *M. horridula* there are normally only four petals. It is to be remembered, however, that the fact that in *M. horridula* there are more than four petals was known to and stated by Hooker and Thomson in 1855. The difference between these authors and Maximowicz is that they thought to be an abnormality, a character which Maximowicz from the outset treated as a normal one.

A slight misapprehension appears to have crept into the scholarly revision in the *Pflanzenreich* in connection with *M. racemosa*, Maxim. It is remarked that the authority for the occurrence of *M. racemosa* in Kansu is a statement to that effect made by the writer in 1906. The statement was made by Maximowicz in 1876, and the *locus classicus* of *M. racemosa* is near the temple of Chobsen, which is situated in Western Kansu, to the east of Kuku-nor and on the western slope of the mountain chain skirted by the Ta-tung River.

It seems possible that another misapprehension may have occurred. Dr. Fedde has figured in the *Pflanzenreich* a capsule of one specimen referred by him to *M. racemosa*.\* This figure shows that in the plant in question the style is much longer and thinner than the style in the specimen of *M. racemosa* figured by Maximowicz in 1889,† which agrees well with the figures given by Dr. Fedde of the style of *M. horridula*. We know that the capsule figured as that of *M. racemosa* in the *Pflanzenreich* was not borne by the specimens collected by Przewalski and Potanin, since in both of these plants the styles are like that of typical *M. horridula* on the one hand and of Maximowicz's figure of *M. racemosa* on the other. It must, therefore, have been borne by one of the three specimens cited by Fedde as having been collected in Szechuan by Soulié. The figure given by Fedde, though unlike the capsule of *M. racemosa* as figured by Maximowicz, is, however, an accurate representation of the capsule of *M. Prattii*, so that

\* Das Pflanzenreich [IV. 104], p. 257, fig. 35 m.

† Flor. Tangut. t. 9, figs. 1, 2 a and b.

one at least of the specimens collected by Soulié should belong to that species. It is not impossible, from the localities in which they were collected, that all three are *M. Prattii*, which species we know, moreover, to have been collected by Soulié near Tachien-lu (Soulié n. 635). *M. racemosa*, Fedde, is therefore a composite species including *M. horridula*, var. *racemosa*, in part, and *M. Prattii*. It would follow, however, that the specimens of *M. Prattii* thus included in *M. racemosa* have ebracteate pedicels. This we know is not impossible, since a *Meconopsis*, stated to have had purple flowers with white stamens, was figured as *M. racemosa* in 1909.\* The plant in question could hardly have been mistaken for *M. racemosa* had its flowers been subtended by bracts; the fact that it is said to have had white stamens—no doubt “white anthers” was meant—shows, however, that it was *M. Prattii*, described above, not the plant with yellow anthers and dark blue petals to which the name *M. racemosa* is usually applied in our gardens.

This particular *Gardeners' Chronicle* reference renders it necessary to call attention to a point which should not be overlooked. It is one which, for the moment, is not very important, but which may prove to be of consequence at some future date. We know that the plant figured by Maximowicz as *M. racemosa* in 1889 is only a form of *M. horridula*, described by Hooker and Thomson in 1855. We know that the plant collected in Eastern Tibet by Przewalski, and the plant collected by Potanin in Northern Szechuan, both of which were distributed by Maximowicz as *M. racemosa*, also belong to *M. horridula*, Hook. f. & Thoms. We know, besides, that *M. horridula* is essentially a Tibetan species, and that its occurrence on the high alps of the Eastern Himalaya and of Western China is but the result of local overflow across the passes leading from Tibet. This being the case, it is remarkable that the locality in which the specimens upon which *M. racemosa* was based should be situated in the Province of Kansu, well to the east of Kuku-nor. Until the contrary has been proved we must accept the figure of *M. racemosa*, given in the *Flora Tangutica* by one of the most careful students of Asiatic plants, who was, moreover, the author of the species concerned, as conveying an accurate conception of the *Meconopsis* collected by Przewalski at Chobsen and described as *M. racemosa* in 1876.

But the writer has not seen a specimen of the original *M. racemosa* from Chobsen, in Kansu, in any of the herbaria he has been able to examine, nor is there any indication that duplicates of this Chobsen gathering have ever been issued to other herbaria. It is not definitely stated that the figure which appears in the *Flora Tangutica* was prepared from a specimen of the original Chobsen gathering. Moreover, no one since Przewalski has collected anywhere in Kansu specimens of the Tibetan *Meconopsis* with dark blue flowers and yellow anthers, figured and distributed by Maximowicz as *M. racemosa*.

On the other hand it is now known that a *Meconopsis* with grey

\* *Gardeners' Chronicle*, 1909, vol. xlv, p. 91, fig. 40.



anthers, which bears a considerable superficial resemblance to the condition of the Tibetan yellow-anthered *M. horridula* in which the flowers are borne on a central compound scape, is widely distributed in Kansu. So striking in some cases is the resemblance between these very different species that in so authoritative a work as the *Pflanzenreich* the two appear to have been confused, while a careful observer in one English garden has mistaken the one for the other.

Therefore until a specimen of the original plant from Chobsen, on which *M. racemosa* was based, can be studied afresh in the light of the knowledge of the genus acquired since 1876, or until specimens of the plant figured as *M. racemosa* in 1889 have been communicated from the Province of Kansu, some doubt must remain as to the incidence of the name used by Maximowicz. Should it be found that, after all, the specimens on which *M. racemosa* was based in 1876 belong to the species with grey anthers and with the capsule figured by Dr. Fedde, the name *M. racemosa*, in familiar use among cultivators of *Meconopsis*, will acquire a new significance. The employment of the name in gardens will cease to be superfluous as it is at present, but, unless the example of Mr. T. Smith in the *Gardeners' Chronicle* for 1909 be followed, will be erroneous.

6. PRIMULINAE, Prain, l.c., p. 349; Fedde, l.c., p. 259 (sect.).

15. **Meconopsis Forrestii**, Prain, Kew Bull. 1907, p. 316; Forrest in Gard. Chron. 1911, vol. l. p. 51. *Capsula* (anno 1907 ignota) anguste cylindracea, parce setosa, 3-5 cm. longa, 5 mm. lata, pedicellis rigidis 3-4 mm. longis demum erectis et ad caulem strictae adpressis suffultae.

SOUTH-WESTERN CHINA: Yunnan; eastern flank of the Li-kiang Range, 10,000-11,000 ft., *Forrest* 2314; mountains in the north-east of the Yang-tse bend, *Forrest* 10799; Chung-tien Plateau, 12,000-13,000 ft., *Forrest* 12507, 12672.

The first gathering of this species was made in June, 1906, in a locality 27°12'N. The field-note with the specimens (*Forrest* 2314) describes it as a plant 6-15 in. high, with pale blue flowers, the filaments of a deeper shade, and the anthers blue; in the actual specimens, however, the anthers are orange-yellow. The second gathering was made in August, 1913, in a locality 27°45'N. The field-note with the specimens, which are in fruit, describes the plant as 12-24 in. high. Mr. Forrest has met with this species twice since, during his 1914 journey. The change of position of the pedicels, which in flower are spreading or even somewhat reflexed, to the erect virgately adpressed one assumed when the capsules are ripe, is very striking. In all of the gatherings of *M. Forrestii* there is only a central compound scape. In this species only two of the four placentae are markedly intruded, the other two are almost nerviform.

16. **Meconopsis lancifolia**, Franch.: Fedde, l.c., p. 259, fig. 35 p (1909).

WESTERN CHINA: Yunnan; Yen-tse-hay, 10,500 ft., *Delavay* 2080; Fang-yang-chang, 10,500 ft., *Delavay*; Tsang-chan, 13,000

ft., *Delavay*; Kou-la-po, 11,500 ft., *Delavay*; Mekong-Salwin Divide, lat. 27°-27°30'N., 14,000-15,000 ft., *Forrest* 469; Tali Range, 11,000-13,000 ft., *Forrest* 1950, 1999, 13517. Western Szechuan; between Batang and Ta-chien-lu, *Wilson* 1364; Wa-san Country, at Wen-chuan-hsien, 11,000-13,000 ft., *Wilson* 3027.

In *M. lancifolia* we experience the variation in habit already discussed under *M. horridula*. The gathering by *Delavay* on Yen-tse-hay above Lankong (*Delavay* n. 2080) and that by *Forrest* of June, 1906, on the eastern flank of the Tali Range (*Forrest* n. 1950) have central compound scapes only; in that by *Forrest* of July and August, 1906, from the same locality as the preceding (*Forrest* n. 1999) some of the specimens have, in addition, one or two simple basal scapes. These July and August plants, moreover, have the terminal flower 5-petalled. But in the case of the two gatherings of this species from Szechuan we find in that collected by *Wilson* in July, 1904 (*Wilson* n. 3164), either that all the scapes are simple, radical and 1-flowered, or that the central scape has but two lateral long-pedicelled flowers on the central scape, while this central scape is accompanied by a number of basal simple ones. In the gathering from Wen-chuan-hsien in the Wa-san country, made in July, 1908 (*Wilson* n. 3027), three out of four specimens have a central scape with only two lateral long-pedicelled flowers, the rest of the blossoms being borne by simple, 1-flowered radical scapes; the fourth specimen, however, has a several-flowered compound central scape unaccompanied by any basal simple scapes.

In facies, therefore, these Szechuan specimens of *M. lancifolia* closely resemble those of *M. Henrici* and of *M. impedita*, but are readily distinguished from the former by the very different anthers and the smaller number of petals, from the latter by the entire leaves, and from both by the narrower capsules and the much shorter styles, under  $\frac{1}{5}$  in. long in *M. lancifolia*, over  $\frac{1}{3}$  in. long in *M. Henrici* and *M. impedita*.

17. **Meconopsis lepida**, Prain; species e grege *Primulinarum* floribus pedicellis ebracteis in cymas racemiformes dispositis ad *M. Forrestii* et *M. lancifoliam* proxime accedens ab ambabus tamen foliis latioribus glabrescentibus vel glabris, petalis numerosioribus clare coeruleis, antherisque gilvis facillime distinguenda.

*Herba* biennis, inermis. *Rhizoma* dauciforme, elongatum, descendens. *Folia* omnia radicalia vel prope basin scapi aggregata, ovato-lanceolata, apice subacuta, basi cuneata vel sensim in petiolum attenuata, margine integra, supra viridia, subtus pallidiora, utrinque glabra vel hinc inde pilis adpressis perpaucis induta, 4-6 cm. longa, 1.75-2 cm. lata; petiolus glaber, 2.5-3 cm. longus. *Scapus* centralis, 12-15 cm. longus, glaber vel pilis simplicibus patentibus vel subretrorsis parce vestitus, florem terminalem 5 cm. latum suffulciens et triente medio pedicellos graciles 1-floros 1-5 cymosim emittens; pedicelli 1-3.5 cm. longi. glabri vel subpatenter hirsuti, flores laterales vix 3 cm. latos

suffulcientes. *Sepala* 2, ovata, glabra vel parcissime setosa, 1.25–1.75 cm. longa. *Petala* 7–8, oblonga, obtusa, majora 2.5 cm. longa, 1.75 cm. lata, intense coerulea. *Stamina*  $\infty$ , 6-seriata, filamentis intense coeruleis discretis glabris; antherae gilvae. *Ovarium* e carpellis 4 compositum, anguste ovoideum, parce hirsutum vel glabrum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis albidis; placentae subnerviiformes; ovula plurima. *Capsula* elongata, angusta (ex Farrer). *Semina* nondum visa.—*Meconopsis*, sp. *M. Delavayi* affinis, Farrer in Gard. Chron. 1914, vol. lvi. p. 138, et 1915, vol. lvii. p. 110.

NORTH-WEST CHINA: Kansu; Thundercrown, on limestone cliffs, 12,000–13,000 ft., Farrer 123.

This charming species, Mr. Farrer notes, “has only been seen on the cooler slopes and rock ledges of the high limestones on Thundercrown, from 12–13,000. It was in splendour on June 20: practically all the seed was gone from the elongate narrow glabrous or very sparsely haired capsules by August 27.” This species has the buff anthers and deep blue petals of the otherwise very different *M. psilononima*, Farrer. Like that fine plant, it is unfortunately biennial and monocarpic.

18. *Meconopsis eximia*, Prain; species e grege *Primulinarum* floribus 7–8-petalis pedicellis ebracteis in cymam racemiformem dispositis cum *M. lepida* congruens ab ea tamen capsula late ovoidea foliis scapis ovarioque setoso-pilosis facillime distinguenda.

*Herba* biennis, inermis. *Rhizoma* dauciforme, elongatum, descendens. *Folia* omnia radicalia vel prope basin scapi aggregata, oblanceolata vel anguste oblongo-lanceolata, apice subacuta, basi sensim in petiolum angustiore attenuata, margine integra, supra pallide viridia, subtus glaucescentia, utrinque setoso-pilosa, 6–10 cm. longa, 1.25–1.5 cm. lata; petiolus 2–3 cm. longus. *Scapus* centralis, 15–40 cm. longus, setis patentibus vel subretorsis densius indutus, flores 3–5 subaequales nutantes 5 cm. diametro in cymam racemiformem dispositos suffulciens. saepius etiam scapis basalibus simplicibus 1-floris additis; pedicelli florum cymae graciles, 1.5–5 cm. longi, patenter setosi, ebracteati. *Sepala* 2, late ovata vel orbicularia, patenter setosa, 1.75 cm. longa. *Petala* 7–8, saepius late oblonga, obtusa, margine integra vel minute crenulata, basi rotundata, 2.75 cm. longa, 2 cm. lata, nonnunquam anguste oblonga, basi cuneata, 2.75 cm. longa, 1.75 cm. lata, intense purpureo-coerulea. *Stamina*  $\infty$ , 4-seriata, filamentis intense purpureo-coeruleis discretis glabris; antherae cinereo-gilvae. *Ovarium* e carpellis 4 compositum, late ovoideum, dense setosum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis albidis; placentae nerviiformes; ovula plurima. *Capsula* ovoidea, 2 cm. longa stylo 5–6 mm. longo excluso, 1.25 cm. lata, dense patenter setosa. *Semina* pallide cinnamomea, incurva; testa reticulata.

SOUTH-WESTERN CHINA: Yunnan; Mekong-Salwin Divide, Lat. 27° 40' to 28° 10' N, 12,000–14,000 ft., Forrest 13020, 13238; Chung-tien plateau, Lat. 27° 30' N, 12,000 ft., Forrest 12691, 13352.

A very handsome species with deep blue-purple nodding flowers and grey-yellow anthers, affecting open, stony pasture-land.

19. **Meconopsis Henrici**, Bur. et Franch.: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 259 (1909); Wilson, Western China, vol. i. pp. 138, 199, et vol. ii. p. 9 (1913).

WESTERN CHINA: West Szechuan; near Ta-chien-lu, 11,000–14,000 ft., *Soulé* 523; *Bonvalot*; *Pratt* 25, 600: *Wilson* 3166; Ton-go-lo, 12,000 ft., *Wilson*; Pan-lan-shan, west of Kuanhsien, 13,000–14,000 ft., *Wilson* 957; Ta-p'ao-shan, north-west of Ta-chien-lu, 12,000–15,000 ft., *Wilson* 3028.

In this species again the habit varies as it does in *M. horridula* among the *Aculeatae* and in *M. lancifolia* and *M. caimia* among the *Primulinae*. The usual condition is that in which, at the commencement of the flowering season, a single simple scape bearing a solitary flower appears in the centre of the crown; this is followed later by the elongation of a number of scapes whose buds are at first hidden among the crown-leaves in the axils of which they arise. These secondary scapes in fruit become nearly as long but are never quite so thick as the primary scape. Not infrequently, however, the original scape bears one or more lateral ebracteate pedicels. An instance of one lateral flower occurs in a specimen collected by *Pratt* in 1890 (*Pratt* n. 25); another case of one lateral flower on the central scape occurs on a specimen collected by *Wilson* in June, 1904 (*Wilson* n. 3166). In another gathering by *Wilson*, at Pan-lan-shan, west of Kuanhsien, at 13,000–14,000 ft., consisting of five specimens obtained in 1908, in flower in June and in fruit in August, two have one lateral pedicel on the central scape, while one has four and another has five lateral pedicels, the two last thus possessing racemose cymes exactly as in *M. horridula*, var. *racemosa*.

This species was introduced to cultivation by Messrs. J. Veitch and Sons in 1906, but has not yet become generally established.

20. **Meconopsis primulina**, Prain: Fedde, l.c., p. 260, fig. 35 c (1909).

This species has not been met with since 1906. The flowers agree in colour with those of *M. lepida* and *M. psilonomma*. From the former it differs in having only simple 1-flowered scapes, of which, as in *M. Henrici*, the central is earlier in appearance and is more robust than the rest. Sometimes only the central scape is produced, when the plant closely resembles a small form of *M. psilonomma*; from that species, however, *M. primulina* is readily distinguished by its different ovary. The fruit of *M. primulina* is still unknown.

21. **Meconopsis psilonomma**, Farrer in Gard. Chron., 1915, vol. lviii. p. 110; species inter *Primulinas* scapo unico elato 1-floro insignis.

*Herba* inermis. *Rhizoma* oblongo-ovatum, brevius. *Scapus* solitarius, simplex, 6–9 dm. altus, parce setis subreflexis indutus. *Folia* omnia radicalia vel prope basin scapi aggregata, oblanceolata vel anguste oblongo-lanceolata, apice subacuta, basi sensim



in petiolum latum attenuata, margine integra, supra pallide viridia, subtus glaucescentia, utrinque parce setoso-hirsuta, 5-8 cm. longa, 1.25-1.5 cm. lata; petiolus 3-5 cm. longus. *Flores* singuli, intense coerulei, speciosissimi, 8-9 cm. lati. *Sepala* 2, extra sparse setosa. *Petala* 7-8, oblonga, obtusa vel retusa, 4.5 cm. longa, 2-2.5 cm. lata. *Stamina*  $\infty$ , 4-seriata, filamentis intense coeruleis discretis glabris; antherae gilvae. *Ovarium* e carpellis 4 compositum, late ovoideum, parce retrosetosum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis albidis; placentae nerviformes; ovula plurima. *Capsula* late obovoidea, 2.5 cm. longa stylo excluso, 1.75 cm. lata, parce retrorso-setosa. *Semina* cinnamomea, incurva; testa reticulata.

NORTH-WESTERN CHINA: Kansu; Alps of Ardjeri, 11,500-12,500 ft., *Farrer* 255.

Mr. Farrer's field note describes this as "a superb species seen only once on one portion of a great grass slope in the Tibetan Alps of Ardjeri, beginning at the topmost limit of *M. punicea* (11,500 ft.) and ascending to the highest ridges at 12,500 ft., where *M. quintuplinervia* seemed pale and poor; . . . it is invariably single-scaped and single-flowered." The anthers in this species are a very pale buff, unlike those of any other member of the *Primulinae* group except *M. lepida*, Prain, another Kansu species.

22. *Meconopsis argemonantha*, Prain; species e grege *Primulinarum* proxime ad *M. primulinam* accedens sed foliis fere glabris subuncinatis petalisque albis facillime distinguenda.

*Herba* inermis. *Rhizoma* . . . *Folia* lanceolata, subrun-  
cinata, apice subacuta basi nunc cuneata et abruptius nunc  
attenuata et sensim in petiolum gracilem vel explanatum  
abundantia; supra saturate viridia, subtus pallidiora, utrinque  
glabra vel prope basin secus marginem nervosque subtus pilis  
longioribus mollibus perpaucis induta, 6 cm. longa, 1.25 cm. lata;  
petiolus 2.75 cm. longus vel brevior. *Scapi* simplices versus  
apicem setis perpaucis sparse obsiti, ceterum glabri. *Sepala*  
. . . *Petala* 6-8, obovata, obtusa, margine crenulato-denticu-  
lata, basi late cuneata, 2.5 cm. longa, 1.5-2 cm. lata, alba.  
*Stamina*  $\infty$ , pauciseriata, filamentis albis gracillimis discretis  
glabris; antherae luteae. *Ovarium* anguste ovoideum, setis  
rigidis parce indutum; stylus elongatus, glaber; stigma capitatum  
lobis decurrentibus brevibus contiguis ex sicco pallide viridibus.  
*Capsula* . . .

EASTERN HIMALAYA: Monyul; Tawang district at Mipak Isan, 13,800 ft., in flower on 17 September, 1913, *Bailey* 6.

7. *BELLAE*, Prain, l.c., p. 351, emend.; Fedde, l.c., p. 261 (sect.) Inermes; perennantes vel raro monocarpicae biennes; caules 0; folia integra, lobata vel pinnatisecta; flores purpurei vel coerulei petalis 4-5; styli distincti; capsula obconica, ovata, vel anguste cylindracea; rhizoma descendens.

23. *Meconopsis Baileyi*, Prain; species e grege *Bellarum* prope *M. impeditam* ponenda sed ovario dense adpresse setoso apte sejungenda.

*Herba* inermis. *Rhizoma* . . . *Folia* . . . *Scapi* graciles simplices setulis brevibus retrorso-patentibus induti. *Sepala* . . . *Petala* 4, ovato-oblonga, obtusa, margine secus latera integra ceterum minutissime denticulata, 1.25 cm. longa, 1.75 cm. lata, coerulea. *Stamina*  $\infty$ , pluriseriata, filamentis coeruleis gracillimis discretis glabris; antherae aureae. *Ovarium* ovoideum, 1 cm. longum, 8 mm. latum, setis adpressis gilvis dense vestitum; stylus brevis (2.5 mm. longus), crassus, glaber; stigma capitatum, lobis decurrentibus brevibus contiguis ex sicco purpureis. *Capsula* . . .

TIBET: Eastern Kongbo; Rong-chu Valley at Lunang, 10,500 ft., 94° 45' W., 29° 45' N., in flower on 10 July, 1913, *Bailey* 8.

**24. *Meconopsis impedita*, Prain;** species inter greges *Primularum* et *Bellarum* quasi medians ob capsulam *M. Henrici* in memoriam reducens sed foliis firmioribus margine lobulatis floribusque ad normam 4-petalis melius in grege *Bellarum* ponenda.

*Herba* biennis, inermis. *Rhizoma* dauciforme, elongatum, descendens. *Folia* omnia radicalia, ovato-lanceolata, apice acuta vel subacuta, basi sensim in petiolum late alatum attenuata, margine pinnatim lobulata vel grosse dentata lobulis obtusis, supra saturate viridia, subtus pallidiora interdum glaucescentia, utrinque parce setosa, 5-6 cm. longa, 1.5-2 cm. lata; petiolus 3-5 cm. longus. *Scapi* numerosi, 15-40 cm. longi, graciliores vel gracillimi, setis patentibus plus minusve induti, 1-flori. *Sepala* 2, suborbicularia, extra setosa, 8-9 mm. lata ac longa. *Petala* 4 rarissime 5, oblonga, obtusa, 2.25 cm. longa, 1.25 cm. lata, saturate coerulea. *Stamina*  $\infty$ , pluriseriata, filamentis intense coeruleis gracillimis discretis glabris; antherae luteae. *Ovarium* e carpellis 4 compositum, latius ovoideum, densius setosum; stylus elongatus; stigma clavatum lobis decurrentibus contiguis; placentae intrusae; ovula plurima. *Capsula* longe obconica, parce setosa, 1.8 cm. longa, 5 cm. lata.

SOUTH-WEST CHINA: Yunnan; Tsekou, *Monbeig*; Mekong-Salwin Divide, Lat. 27°-28° N, 12,000-13,000 ft., on open stony barren limestone ridges, *Forrest* 459, 13,314: without precise locality, *Maire*, *Ward* 792.

This very distinct species might with almost equal propriety be placed either in the group *Primulinae* or in the group *Bellae*. The capsule and the long style closely resemble those of *M. Henrici* in the former group, but the very densely tufted leaves, which are of the same consistence as those of the *Bellae* and are, moreover, lobulate along the margins, coupled with the fact that the flowers are normally 4-petalous and the scapes are all simple, indicates the desirability of associating it with the latter rather than with the former group. The flowers are all 4-petalous except on one or two, not all, of the scapes in the specimens collected by Ward. *Forrest* in the field-note accompanying a somewhat imperfect specimen from the Mekong-Salwin Divide (*Forrest* n. 459), obtained in July or August, 1905, describes the scapes as being 6-10 in. high with deep rich blue pendulous

solitary flowers. In one of Maire's specimens the scapes are 15-18 in. high.

An imperfect specimen collected near the head-waters of the Rong-chu in South-Eastern Tibet, on Verma-la (Nyima-la), 15,000 ft., 94° 45' W, 29° 37' N, by Captain F. M. Bailey, in flower on 12 July, 1913, comes nearest to this species. The leaves are similar in shape, lobulation and indumentum, but are somewhat thinner; the indumentum of the scapes is the same, and the ovaries agree with those of *M. impedita*. The filaments, however, are considerably shorter. For the moment it is best treated as a variety of *M. impedita*:—

Var. **Morsheadii**, Prain; forma *M. impeditam* typicam in memoriam reducens sed floribus majoribus petalis pallidius coeruleis filamentis parum brevioribus.

TIBET: Eastern Kongbo; Verma-la, 15,000 ft., Bailey 9.

25. **Meconopsis bella**, Prain; Fedde, l.c., p. 261, fig. 35j (1909); Mottet in Rev. Hort. 1912, p. 205; Smith in Rec. Bot. Surv. India, vol. iv., p. 348 (1913).

This species has been met with again in Western Sikkim at Megu, 14,000 ft. (Romoo 834, 6443), and on a later occasion in Eastern Sikkim, at Tosa, Chakung Chu, 14,000-15,000 ft., usually in the moist crevices of cliffs facing north, Smith 3926, 4084; Ribu 4463.

26. **Meconopsis concinna**, Prain; species e grege *Bellarum* ad *M. bellam* ipsam accedens sed foliis lanceolatis nec ambitu ovatis minus divisis vel integris, rhizomate brevior lobulato, capsulaque elongata anguste cylindracea valvis altius fissis facillime distinguenda.

*Herba* forsan biennis, inermis. *Rhizoma* subtuberosum, 1.5-2 cm. longum, in segmenta 2-3 crassiora divisum, descendens. *Folia* omnia radicalia, lanceolata, runcinata lobulis ovatis vel lineari-lanceolatis obtusis raro iterum divisis 3-7-jugis, nonnunquam aliquot vel omnia integra, supra saturate viridia, subtus glaucescentia, utrinque glabra, 1.5-2 cm. longa, 5 mm. lata; petiolus glaber, 1.5-2 cm. longus. *Scapi* numerosi, 5-15 cm. longi, gracillimi, glabri vel setis patentibus parce induti demum glabrescentes, 1-flori. *Sepala* 2, late ovata, extra parce hirsuta vel glabra, 7-8 mm. longa. *Petala* 4, late oblonga, obtusa, apice crenulata vel denticulata, 1.25 cm. longa, 1 cm. lata, coerulea purpureo suffusa. *Stamina* ∞, circiter 32, 4-seriata, filamentis coeruleo-purpureis discretis glabris; antherae cinerascens. *Ovarium* e carpellis 4 compositum, anguste fusiforme, glabrum vel setis perpaucis obsitum; stylus distinctus; stigma clavatum lobis decurrentibus contiguis; placentae nerviformes; ovula plurima. *Capsula* anguste cylindracea, glabra, 2.5-2.75 cm. longa, 4 mm. lata, ad medium usque valvarum dehiscens. *Semina* brunnea, incurva; testa striata vix reticulata.

SOUTH-WEST CHINA: Yunnan; mountains in the north-east of the Yung-tse bend, Lat. 27° 45' N. 13,000-14,000 ft., in flower in July, Forrest 10404; in fruit in September, Forrest 10979;

Chung-tien Plateau, 12,000 ft., *Forrest* 12670; mountains west of Feng-kou, 12,000 ft., *Forrest* 12706; Li-kiang Range, 12,000 ft., *Forrest* 12796.

The field-note accompanying flowering specimens of this pretty little alpine species (*Forrest* n. 10404) describes the scapes as from 3-6 in. long, and the flowers as deep purplish blue. The valves, in place of separating from the placental ribs at their apices only, do so for from one-third to one-half of their length, thus approaching the condition characteristic of *Cathcartia villosa*. The plant was met with in stony pastures and on the ledges of limestone cliffs. The appearance of the flowering, and especially of the fruiting specimens suggests that this is a biennial species. The three gatherings quoted last were obtained by Mr. *Forrest* in 1914.

27. *Meconopsis venusta*, Prain; species e grege *Bellarum* ad *M. concinnam* proxime accedens et primo intuitu pro varietate ejusdem habenda, sed foliis integris spathulato-ovatis nec lanceolatis vel pinnatisectis lobulis paucioribus inter se magis discretis et praesertim rhizomate multo majore dauciforme satis differt.

*Herba* biennis, inermis. *Rhizoma* elongatum, dauciforme, 12-14 cm. longum, 1 cm. crassum, descendens. *Folia* omnia radicalia, ima vel rarissime omnia integra lamina oblongo-ovata, obtusa vel subacuta, basi truncata, 1-3.5 cm. longa, 8 mm. - 1 cm. lata, cetera pinnatisecta, lobis 1-2-jugis late oblongis vel orbicularibus obtusis, terminali 1 cm., lateralibus 3-5 mm. latis, supra saturate viridia, subtus intense glauca, utrinque glabra; petiolus late alatus, 4-6 cm. longus, glaber, margine membranaceus. *Scapi* numerosi, 15-20 cm. longi, graciles, glabri vel setis patentibus parce induti demum glabrescentes, 1-flori. *Sepala* 2, late ovata, extra glabra, 1-2.5 cm. longa. *Petala* 4, suborbicularia, obtusa, margine integra vel minutissime undulata, 2-2.5 cm. longa ac lata, intense rubro-purpurea. *Stamina*  $\infty$ , circiter 64, 4-seriata, filamentis intense rubro-purpureis gracilimis discretis glabris; antherae aurantiacae. *Ovarium* e carpellis 4 compositum, anguste fusiforme, setis patentibus densius indutum; stylus distinctus; stigma clavatum lobis decurrentibus confinis; placentae nerviformes; ovula plurima. *Capsula* anguste cylindracea, setis rigidis patentibus vestita, 3.5-4 cm. longa, 5 mm. lata, vix per trientem summum dehiscens. *Semina* cinnamomea, incurva; testa striata vix reticulata.

SOUTH-WEST CHINA: Yunnan; mountains in the north-east of the Yang-tse bend, lat. 27° 45' N, 13,000 ft., in flower in July, *Forrest* 10408; in fruit in September, *Forrest* 11008; Chung-tien Plateau, Lat. 27° 30' N, 13,000-14,000 ft., *Forrest* 12685, 12686, 12993.

The field-note accompanying flowering specimens of this equally charming alpine species (*Forrest* n. 10408) describes the scapes as 9-14 inches long and the flowers as deep purplish wine-colour, the anthers being orange. It was met with in situations similar to the preceding; in stony limy alpine pastures and on humus-covered boulders. In this species the valves open to a greater extent than is usual in species of *Meconopsis*, but hardly



so far as to suggest a comparison with *Cathcartia*. The stout root-stock of this species, with its collar of the remains of leaves of an earlier season surrounding the crown of fresh leaves at their base, is so like that of *M. bella* as to suggest that *M. venusta* is also polycarpic. The three gatherings cited last were obtained by Mr. Forrest in 1914.

28. **Meconopsis Delavayi**, Franch.: Fedde, l.c., p. 261 (1909); Forrest in Gard. Chron. 1911, vol. 1. p. 51, fig. 24; Mottet in Rev. Hort. 1912, p. 205; Gard. Chron. 1913, vol. liii. p. 357; Gard. Mag. 1913, p. 394; Garden, 1913, p. 275 cum icon.; Kew Bull. 1914, app. 3, p. 72. *Rhizoma* haud repens sed descendens, 3-4.5 dm. longum, 1.5 cm. crassum, pluriceps. *Scapus* solitarius, rarissime casu scapi 2, fructiger elongatus, ad 5-6 dm. altus. *Petala* 4, raro 5. *Capsula* (anno 1906 matura ignota) anguste cylindracea, erecta, 5-7.5 cm. longa, nonnunquam (ex Forrest) 15 cm. longa, 6 mm. lata.

SOUTH-WEST CHINA: Yunnan; eastern flank of the Li-kiang Range, Lat. 27° 12' N, 10,000-14,000 ft., *Delavay*; *Forrest* 2272, 10128.

The nearest alliance of this species has been somewhat doubtful. The flowers in some of the specimens originally collected by Delavay have 6-7 petals, and as a result we have here a repetition of the problem presented by the case of *M. horridula*, as to which Hooker and Thomson in 1855 considered the 6-8-petalous state an abnormality, whereas Maximowicz has decided that it is the normal condition. Treating the two cases as parallel the writer in 1896 included *M. Delavayi* in the *Primulinae* where it is usual to find more than 4 petals in the flowers. Now that ample suites of specimens have been communicated by Forrest from the *locus classicus* of the species, it is clear that the cases are not parallel; in *M. Delavayi* the petals are normally 4 or occasionally 5, but the cases with 6-7 petals are abnormal. The species is therefore better placed in the group *Bellae*, though within that group it stands somewhat apart in having, as a rule, a solitary scape to each crown, and in having entire leaves. This last feature is not, however, quite unique, for the leaves both in *M. venusta* and in *M. concinna* may at times be entire as in *M. Delavayi*. The species has been introduced to European gardens through the Royal Botanic Garden, Edinburgh, by seeds collected by Mr. Forrest.

§§ **POLYCHAETIA**, Prain in Ann. Bot. vol. xx. p. 352 (sect.); Fedde, l.c., p. 262 (subgen.).

8. **GRANDES**, Prain, l.c., p. 352; Fedde, l.c., p. 262 (sect.).

29. **Meconopsis integrifolia**, Franch.: E. H. Wils. in Gard. Chron., 1905, vol. xxxvii. p. 291, fig. 121; Tallack, l.c., p. 317, E. H., l.c., et Challis, l.c., p. 341, et Veitch, l.c., vol. xxxviii. p. 32; Garden, 1905, vol. xlvii. p. 286 cum icon.; E. W. Meyer in Gartenw. 1905, vol. ix. p. 534 cum icon. col.; Gard. Album, 1906, t. 5; Veitch, Novelties 1907, p. 17; Rev. Hort. Belg. 1907, p. 189; Trib. Hortie. 1908, tt. 90, 91; Fedde, l.c. p. 262, fig.

35 E (1909); Jenkins in Gard. Chron. 1909, vol. xlv. p. 146; fig. 60; Forrest, l.c., p. 339 cum icon.; anon. l.c., p. 358 partim; Divers, l.c., p. 378; Baker, l.c., p. 399; Jenkins, l.c., p. 440; Mottet in Rev. Hort. 1912, p. 204; Wilson, Western China, vol. i. pp. 138, 181, 199, et vol. ii. p. 9 (1913); Farrer in Gard. Chron. 1914, vol. lv. p. 318.

var. **Souliei**, Fedde, l.c. (1909).

The variety described by Dr. Fedde, which he suggests may be a distinct species, does not appear to have yet been introduced to European gardens, nor has the writer seen specimens.

What may perhaps prove to be another variety of *M. integrifolia*, with racemiform in place of umbelliform cymes, has been reported by the late Lieut. J. W. Brooke from the Balang Range in Kansu.

In 1907 Mr. R. H. Beamish crossed this species with *M. grandis* in his garden at Ashbourne, near Cork. The hybrid flowered there for the first time in May, 1909.

**Meconopsis grandis** × **integrifolia** aut **integrifolia** × **grandis**; hybrida arte inter *M. grandem*, Prain et *M. integrifoliam*, Franch. in horto Beamishiano facta.

*Herba* perennis, pubescens. *Rhizoma* coarctatum vestigiis foliorum vetustorum instructum. *Folia* radicalia 8–12, subrosulata, apice acuta, basi in petiolum attenuata, margine integra, 15–18 cm. longa, 3–4 cm. lata; petiolus 6–8 cm. longus. *Caulis* evolutus, 18–25 cm. longus, inferne nudus, apice foliis sive bracteis floralibus 4–5 foliis radicalibus conformibus nisi sessilibus et parum minoribus ornatus. *Pedicelli* 4–5, 25 cm. longi, 1-flori. *Sepala* 2, pubescentia, ovata, 3 cm. longa. *Petala* 6–8, intus citrina basi oculo triangulari pallide purpureo notata, extra purpurascentia, ovato-oblonga, 7–8 cm. longa, 5–6 cm. lata. *Stamina* ∞, pluriseriata, dense compacta filamentis discretis glabris citrinis purpureo suffusis; antherae aeneae. *Ovarium* subcylindricum, parce pilosum. *Stylus* obsoletus; stigma depresso-dilatatum lobis radiantibus divaricatis. *Capsula* lineari-oblonga, parce pilosa, 3–4 cm. longa.—*M. integrifolia* × *grandis*, Paine in Gard. Chron. 1911, vol. l. p. 22, fig. 14; Kew Bull. 1912, app. 3, p. 54. *M. grandis* × *integrifolia*, Beamish in litt.

Though stated by Mr. Paine, l.c., in 1911, to have been the cross *integrifolia* × *grandis*, Mr. Beamish, in announcing the success of his effort, described it as being the cross *grandis* × *integrifolia*. Whether the parentage were the one or the other the plant exhibits a striking mixture of the characters of the two parents. The leaves on the whole, and the habit of the plant follow *M. integrifolia*, as do the petals save for the purple flush on the outer side. The anthers, on the other hand, follow *M. grandis*, as does the pistil except for the absence of style. The most interesting and most important particular in which *M. Beamishii* has taken after *M. grandis* is in its proving polycarpic. Writing on May 21, 1909, Mr. Beamish intimated that he had discovered a small crown springing from the base of the plant, and in Mr. Paine's note published on July 15, 1911, it is stated that the hybrid had definitely assumed the character of a per-

ennial. It proved of more vigorous growth than either parent until 1914; during the winter of 1914-15 it unfortunately perished.

30. *Meconopsis pseudointegrifolia*, Prain: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 263 (1909). *M. integrifolia*, Bulley in Gard. Chron. 1905, vol. xxxvii. p. 200, 325 partim; Masters, l.c. 1906, vol. xxxix. p. 313; anon. l.c. 1911, vol. 1. p. 358 partim: nec Franch.

SOUTH-EASTERN TIBET: Kham; in the Ra-chu valley, near the sources of the Mekong, Lat. 29° 30' N., Lon. 97° 30' E., 11,000-12,000 ft., Koslov.

SOUTH-WEST CHINA: Yunnan; Chung-tien Plateau, Lat. 27° 30' N, *Forrest* 12,522; Mekong-Salwin Divide, Lat. 28° 10' N, 13,000 ft., *Forrest* 13,311; without precise locality, *Monbeig*.

As has been pointed out in the *Pflanzenreich* this species was erroneously stated in 1906 to be from South-western instead of South-eastern Tibet. In the Gardeners' Chronicle for 1911, l.c. the view was once more expressed that this may be only a form of *M. integrifolia*. The species has, however, been met with again by Père Monbeig in South-western China, and his material indicates that the suggestion alluded to is untenable. Monbeig's plant, however, shows that the plant as grown in this country was not "in character"; in the wild state the flowers are in 5-7-flowered umbelliform cymes in the axils of a fascicle of leafy bracts, just as in *M. integrifolia* and in *M. grandis*. Mr. Forrest's specimens of 1914 in flower (*Forrest* n. 12522), and in fruit (*Forrest* n. 13311), are exactly like Père Monbeig's plant.

31. *Meconopsis grandis*, Prain: Bulley in Gard. Chron. 1905, vol. xxxvii. p. 397; Fedde, l.c. p. 263, fig. 35 d (1909); Mottet in Rev. Hort. 1912, p. 205.

32. *Meconopsis simplicifolia*, Walp.: Fedde, l.c., p. 263, fig. 35 f (1909); Bot. Mag. t. 8364 (1910); Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 171 (1911); Mottet in Rev. Hort. 1912, p. 203; Smith in Rec. Bot. Surv. Ind. vol. iv. p. 348 (1913). *Polychaetia scapigera*, Wall. Cat. sub 8125 (1830).

This species has been raised in the Royal Botanic Garden, Edinburgh, from seeds collected by Captain F. M. Bailey, on Pen-la, Lon. 92° 15' E, Lat. 27° 57' N, at 17,000 ft., on the Subansiri-Manás Divide, in September, 1913. It has also been raised at Edinburgh from seeds received by Professor Balfour from the Tibeto-Yunnan frontier. The plants flowered in the Alpine collection there in October, 1911, and agreed in every detail with the specimens already known from Nepal, Sikkim, Chumbi and the Tibetan districts of Khamba and Phari. The considerable extension of its area towards the east indicated by these recent specimens suggests that *M. simplicifolia*, like *M. horridula*, may be essentially a Tibetan plant, and that its presence on the southern aspect of the Himalaya from Nepal to Chumbi may be due to overflow across the high passes. The authority for the name now used for this species has, in the *Pflanzenreich*, been inadvertently attributed to Mr. G. Don, who treated it as a *Stylophorum*.

33. *Meconopsis quintuplinervia*, Regel, Gartenfl. vol. xxv. p. 291, t. 880, figs. b, c, d (1876); Maxim. Fl. Tangut. p. 34, t. 23, fig. 27 (1889); Prain in Journ. As. Soc. Beng. vol. lxiv. pars 2, p. 321 (1896); Flora and Sylva, vol. iii. p. 84 (1905); Prain in Ann. Bot. vol. xx. p. 354 (1906); Mottet in Rev. Hort. 1912, p. 203. *M. quintuplinervis*, Diels in Engl. Jahrb. vol. xxix. p. 354 (1901), et vol. xxxvi. Beibl. n. 82, p. 46 (1905); Fedde, l.c. p. 264, fig. 35 G (1909); Farrer in Gard. Chron. 1914, vol. lvi. p. 318, fig. 126, et 1915, vol. lvii. p. 1.

NORTHERN AND WESTERN CHINA: Shensi; Mt. Thae-pei-san, 10-20 August, 1894, *Giraldi* (Herb. Biondi, n. 766); Pao-ki-san District, on Mt. Abiao-wang-san, July, 1899, *Scallani* (Herb. Biondi, n. 4491); eastern slopes of Mt. Ngo-san, August, 1899, *Giraldi* (Herb. Biondi, n. 4492); Mt. Huan-ton-san, July, 1900, *Giraldi* (Herb. Biondi, n. 7032). Kansu; Ta-tung, 9,500-11,000 ft., *Przewalski*, *Potanin*; Hong-chiao Pass in the Balang Range, 14,000 ft., *Brooke*; Alps of the western border of Kansu, 9,000-12,000 ft., and on the Min S'an Alps, 10,000 ft., *Farrer* 118; Sining district, 11,000 ft., *French Ridley* 18. Szechuan; Tsaku-lao, *Bock and Rosthorn*.

TIBET: Amdo, 9500-11,000 ft., *Potanin*.

This species was originally found in Kansu by *Przewalski* and was first described in 1876 from a plant raised in the Imperial Botanic Garden at Petrograd from seed communicated by that explorer. Later it was met with by *Potanin* in Tibet. In the figure originally published by Dr. Regel, the ovary is shown with a distinct though short style, and in the text the existence of a style is mentioned. This statement is repeated in the description published by Mr. Maximowicz in 1889, and has been accepted in the account of the genus published in 1906 and in the *Pflanzenreich* text of 1909.

During Mr. E. H. Wilson's journey in China in 1908, that traveller made the acquaintance of the late Mr. J. W. Brooke and learned from him that when travelling in Kansu another species of *Meconopsis* had been met with. The species being new to Mr. Wilson, Mr. Brooke at his request sent to Kew a photograph and a specimen of the plant. These showed that the species in question is *M. quintuplinervia*, and showed, moreover, that in this plant the stigma is sessile as it is in *M. integrifolia* and in *M. punicea*, and that the *Gartenflora* figure is in this particular erroneous. It is to be noted, however, that, although Dr. Regel's error has found its way into the text of the *Pflanzenreich*, the figure of the capsule given in that work is accurate. To Dr. Fedde we further owe the first intimation of the fact that *M. quintuplinervia* is common in Shensi as well as in Kansu.

Yet another misapprehension with regard to this species has been removed by Mr. Farrer. Owing to the fact that the plant, when first introduced to cultivation, had proved monocarpic, the possibility of its being so in the wild state was suggested in 1906 and adopted in the *Pflanzenreich*. Fortunately Mr. Farrer is able to assure us that in the wild state *M. quintuplinervia* is undoubtedly polycarpic, and when regard is had to its natural



beauty, it is to be hoped that its re-introduction may lead to its permanent establishment in our gardens. Mr. Farrer remarks that on the occasion of a previous introduction to cultivation, *M. quintuplinervia* was confused with *M. simplicifolia*. This confusion did not take place when the species was first introduced by Przewalski forty years ago. Perhaps, however, Mr. Farrer may refer to some subsequent introduction, the record of which has escaped Dr. Fedde and the writer.

An inadvertent modification of Dr. Regel's original specific name, in a paper by Professor Diels published in 1901, has found its way into the *Pflanzenreich*, and the adoption of this erroneous orthography in the Gardeners' Chronicle may, unless timely attention be paid to it, give rise to yet another misapprehension.

34. ***Meconopsis punicea***, Maxim.: Garden, 1905, vol. xlvii. p. 318 cum icon; Riebe in Gartenw. 1906, pp. 273, 274; Fedde, l.c., p. 265, fig. 35 H (1909); Mottet in Rev. Hort. 1912, p. 205; Wilson, Western China, vol. i. pp. 138, 181 et vol. ii. p. 9 (1913); Farrer in Gard. Chron. 1915, vol. lvii. p. 1.

When writing to Kew from Chen-t'u on October 28th, 1908, the late Mr. J. W. Brooke enclosed, along with a photograph of a plant of *M. quintuplinervia*, Regel, *in situ* on a hillside in the Hung-chiao Pass, a second photograph showing a number of plants of different species of *Meconopsis* brought together from various localities on the Balang Range.\* One of these is *M. punicea*, Maxim., which is represented by three examples. The prevalence of this species in the province of Kansu has more recently been confirmed by Mr. Farrer. Although Mr. Brooke states that there are six different species in his group, the writer has only been able to distinguish three. These are *M. punicea*, Maxim., which is readily recognisable; *M. quintuplinervia*, Regel, also readily identifiable because of the accompanying photograph of a single plant, the latter being verified by a corresponding specimen; and *M. integrifolia*, Franch. In this instance, however, the photograph reveals a form of *M. integrifolia* that has not been encountered by other travellers; in place of the subumbellate cyme with large leafy bracts subtending the pedicels we have in this case a raceme-like cyme of flowers as in the unusual condition of *M. Henrici*, Bur. & Franch., obtained by Mr. E. H. Wilson at Pan-lan-shan, in Western Szechuan, where that traveller also found *M. punicea* growing in abundance. If there be other species in the group it is not possible to discriminate them. There are at Kew specimens or drawings of three other Kansu species, *M. Pratti*, *M. lepida* and *M. psilonomma*, the first known from specimens collected by Mr. Purdom, the others from specimens communicated to Professor Bayley Balfour by Mr. Farrer. In addition to the species men-

\* This interesting photograph was published in 1911 as *Some poppies near the snow-line in Ferguson: Adventure, Sport and Travel on the Tibetan Steppes*, p. 174. It is possible that by 'six species' Mr. Brooke really meant 'six plants'; the photograph shows three of *M. punicea*, two of *M. quintuplinervia* and one of a racemiform condition of *M. integrifolia*.

tioned, the same province contains the *locus classicus* of the original type of *M. racemosa*, Maxim.

9. *TORQUATAE*, Prain, l.c., p. 355; Fedde, l.c., p. 265 (sect.).

35. *Meconopsis torquata*, Prain: Fedde, l.c., p. 265 (1909). This species has not been collected since 1904.

36. *Meconopsis discigera*, Prain: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 266.

This fine species has been introduced to cultivation by the Royal Botanic Garden, Edinburgh. It has been collected again in Sikkim on Guch-la, 16,000 ft., *Romoo* 1036, on the second occasion in flower. The sepals are ovate, hirsute externally, 1 in. long,  $\frac{3}{4}$  in. across; the petals are yellow, wide ovate, 2 in. long,  $1\frac{1}{2}$  in. wide. The plant is polycarpic.

10. *ROBUSTAE*, Prain, l.c., p. 357; Fedde, l.c., p. 267 (sect.).

37. *Meconopsis superba*, King: Fedde, l.c., p. 267 (1909).

This species has not been met with since it was first collected in 1884 in Bhutan.

38. *Meconopsis paniculata*, Prain: Fedde, l.c., p. 267, figs. 34 E, F (1909); Smith & Cave, Rec. Bot. Surv. India, vol. iv. p. 171 (1911); Mottet in Rev. Hort. 1912, p. 204; Smith in Rec. Bot. Surv. India, vol. iv. p. 347 (1913).

It has already been explained that the condition recognisable as *M. paniculata* proper, with compound cymules in the axils of the leafy bracts, is hardly separable as a variety from the form recognised in 1896 as var. *elata*, in which the cymules are simple. By a regrettable error the differential character which distinguishes the original *Papaver paniculatum*, D. Don, has been used in the account of the genus published in 1906 (Ann. Bot. vol. xx. p. 358) in place of the character which really distinguishes var. *elata* from Don's original plant; this error unfortunately has not been noticed in the *Pflanzenreich*. For the character "flores in cymas laxae paniculatas dispositi caeterum typi," which is given in the Annals of Botany, l.c., should be substituted the following:—

Var. *elata*, Prain, Journ. As. Soc. Beng., vol. lxiv. pars. 2, p. 316; flores in cymas simplicibus dispositi, pedicelli saepius solitarii nonnunquam bini, patentes, sub anthesi foliis floralibus haud vel vix longioribus, fructigeri elongati adscendentes vel virgati erecti.

Experience in gardens since 1906 has indicated that it is more desirable than had been thought to keep the two forms varietyally apart.

Deviation from the normal 4-petalous condition appears to be extremely rare in the species which constitute the group *Robustae* as compared with the members of the group *Bellae*, and to be rare even as compared with the normally 4-petalous species which occur in the groups *Aculeatae* and *Primulinae*. In the only instance with which the writer has met, the deviation has not taken the form of multiplication but of reduction in

number of petals. The example was communicated to Kew by Mr. R. H. Beamish in 1907. The two outer petals alternating with the sepals are normal, but the two inner petals opposite to the sepals are replaced, on one side by a solitary abnormal stamen with a petaloid filament and broad connective, on the other side by two perfect stamens indistinguishable from the normal stamens save by their definite position with relation to the petals and to the components of the outer series of filaments in the androecium proper.

39. *Meconopsis robusta*, Hook. f. & Thoms.: Fedde, l.c., p. 268, fig. 34 D (1909); Mottet in Rev. Hort. 1912, p. 204.

When using the *Pflanzenreich* students should note that the name *M. robusta* was not, as the text at first sight seems to imply, applied by the late Dr. Wallich either to the plant from Gossain Than in Central Nepal, issued by him as n. 8121, or to that from Kamaon, issued by him as n. 8124. One specimen of the gathering issued by Wallich as n. 8121 had, prior to the distribution of the Hon. E.I.C. Herbarium, been made by A. P. De Candolle the basis of *M. napaulensis*, DC., of which, therefore, n. 8121 is a co-type, though Wallich, in issuing the remaining specimens of that gathering, did not use this or any other specific name. The plant issued, also without a specific name, as Wallich n. 8124, was subsequently used by Dr. Hooker and Dr. Thomson as the basis, along with another Kamaon gathering, Wallich n. 8126 E, of *M. robusta*, Hook. f. & Thoms. There was not an interval of two years, as suggested in the *Pflanzenreich*, between the issue of Wallich n. 8124 and Wallich n. 8126 E, which last in the *Pflanzenreich* has inadvertently been cited as n. 8127 E. In 1855, when *M. robusta* was first described, Hooker and Thomson did not deal with Wallich n. 8121, on which *M. napaulensis* DC. had been based before that distribution number had been applied to this particular gathering. In 1872 these authors included the Nepalese n. 8121 in their *M. robusta*, but omitted n. 8126 E. The fact that the Nepalese plant collected at Gossain Than in August, 1821, which was distributed in 1830 as Wallich n. 8121, was that on which De Candolle had based his species *M. napaulensis* in 1824, did not become known until 1895, so that Hooker and Thomson were not in a position to replace the name *M. robusta*, published by them in 1855, by the name *M. napaulensis* which had been applied to the Nepalese plant in question in 1824.

There is a slight discrepancy, therefore, between the statement made in the text of the *Pflanzenreich* that *M. robusta*, as defined by Hooker and Thomson, must be accepted in a sense which excludes this Nepalese plant, and the more important statement in the second footnote on the same page, that Wallich n. 8121, which is the Nepalese plant in question, is identical with the Kamaon plant, Wallich n. 8124, which is the type of *M. robusta*. This acceptance of the view taken by Hooker and Thomson in 1872, in preference to the earlier treatment by the same authors, involves two consequences. The geographical area of the species should include Nepal, since Wallich n. 8121

was collected in that country; the name of the species which includes Wallich n. 8121 should be the name applied to a plant of that gathering in 1824 rather than the name first given to it in 1872, more especially since that latter name was not applied to any *Meconopsis* until 1855. The circumstance that the Petrograd herbarium includes a specimen issued by Wallich as n. 8121 which cannot be distinguished from specimens of Wallich n. 8124 does not affect the relationship which the examples of these two gatherings in the Wallichian Herbarium itself bear to each other. This relationship may be most readily realised from the photograph of these which accompanies this paper, and an examination of that photograph may enable students of this genus to decide whether *M. napaulensis* and *M. robusta* be conspecific or not.

There are certain difficulties connected with the identification of Wallich n. 8121 and Wallich n. 8124. In the former, when in flower, the leaves, besides being beset with long barbellate setae, have, at least on the upper surface, a fine pubescence as well. In the fruiting specimens this fine pubescence has disappeared from the leaves, but the barbellate setae still persist. In the latter, when in flower, the leaves have the same covering of long barbellate hairs, but have no fine pubescence in addition; in fruit the barbellate setae almost entirely disappear, and the leaves are very nearly glabrous. The difference between the two is greater as regards the capsule, which in Wallich n. 8121 has 5 or casually 6 valves, but in Wallich n. 8124 has 7, or more often 8 valves. In both plants the ovary is at first adpressed-setose, but the setae of the fully developed capsule in the former become rigidly patent and persist—even in the oldest capsules seen the bases of the setae remain and stand out at right angles to the surface of the valves; in the latter most of the setae disappear from the ripe capsule, and the few that persist remain adpressed to the surface of the valves. The style in the Nepalese plant, n. 8121, is longer and more slender than in the Kamaon plant, n. 8124, and in this respect, as well as in the smaller number of valves beset with persistent patently-spreading setae, the ripe capsules of Wallich n. 8121 from Central Nepal differ from those of the yellow-flowered *M. robusta* from Kamaon to which Wallich n. 8124 belongs, and agree with those of the red-flowered *M. Wallichii* var. *fusco-purpurea* from Eastern Nepal and Sikkim. As there is no species of *Meconopsis* so far known in which the petals are sometimes yellow and sometimes red, it follows that if we could ascertain the colour of the petals in the species described by De Candolle in 1824 as *M. napaulensis* and distributed by Wallich in 1830 as his n. 8121, we should be in a position to pronounce a final verdict on the question as to whether the view with regard to this plant, taken, as an after-thought, by Hooker and Thomson in 1872 and more authoritatively reaffirmed in the *Pflanzenreich* in 1909, be tenable.

Unfortunately we have no direct statement on this point, and have to content ourselves with circumstantial evidence. We know that in August, 1821, Wallich obtained three species of *Meconopsis* from the mountain of Gossain Than in the north of



Central Nepal. We know that in 1830 Wallich distributed these three species as his nn. 8121, 8123b and 8125, respectively. The third species is a scapigerous plant which was described by D. Don in 1825 as *Papaver simplicifolium*, and again by G. Don in 1831 as *Stylophorum simplicifolium*, and was transferred by Walpers in 1842 to *Meconopsis* as *M. simplicifolia*. Wallich in 1830 had already placed it in its true genus, but had cited it under a different specific name, proposed but not published by himself in 1821. This species, not having a tall branching stem, only interests us in our present enquiry owing to the fact that the sheet of n. 8125 in the Wallichian type herbarium bears an original label with the legend "*Polychaetia scapigera*, Wall. Gossain Than Augusto, 1821."

The species issued by Wallich in 1830 as n. 8123b is accompanied by a similar label written up by Wallich with the legend "*Polychaetia paniculata*, Wall. Argemone et Papav. prox. Goss. Than Augusto, 1821." The species thus indicated is the one with tall branching stems and yellow flowers described by D. Don in 1825 as *Papaver paniculatum*. On the other hand, the species issued by Wallich in 1830 as n. 8121 under the Catalogue entry "*Meconopsis e Gossain Than*" has no original label corresponding to those which accompany n. 8123b and n. 8125. Like n. 8123b, n. 8121 is a species with tall branching stems.

The absence of a label dating from 1821 in the case of n. 8121 suggests that when the specimens were first brought to him, Wallich may have looked upon the two Nepalese mountain poppies with tall branching stems as forms of one species. There is a circumstance which, so far as it goes, is in keeping with this suggestion. Some time prior to 1824, Wallich sent from Calcutta to De Candolle in Geneva one specimen of a Nepalese *Meconopsis* with a tall branching stem, and at the same time sent to Lambert in London another specimen of a Nepalese *Meconopsis* with a tall branching stem. The specimen sent to Geneva was made the basis of *M. napaulensis*, DC., in 1824; that sent to London became the basis of *Papaver paniculatum*, D. Don, in 1825; moreover, Don took it for granted, at the time, that the two specimens in Geneva and in London represented the same plant. That De Candolle had received from Wallich a note not unlike the legend on the original label in Wallich's own herbarium is at least possible; the remark in the Prodrômus "*habitus fere Glaucii aut Argemones. An genus? an sectio propria*" is not incompatible with this suggestion. We know, however, that the specimen which is the basis of *M. napaulensis*, DC., and of which through the courtesy of Mr. C. de Candolle we are able to publish a photograph, is part of the gathering issued by Wallich as his n. 8121, a photograph of which, as represented in Wallich's own herbarium, is also given here. We know, too, that the plant which was made the basis of *Papaver paniculatum*, D. Don, was part of the gathering which Wallich named *Polychaetia paniculata* in 1821, and issued as his n. 8123b in 1830. An examination of the photograph of the specimen of this gathering in the Wallichian herbarium will enable the difference between the plants described by De Candolle and Don respectively to be

readily appreciated, and explain how it came about that even if, in 1821, Wallich did suppose the two to be conspecific, he was induced, in 1830, to treat them as distinct.

We know that Wallich possessed more information concerning the gatherings of *Meconopsis* obtained by him in Nepal than the labels in his herbarium convey. We learn from D. Don\* that Wallich supplied, with the specimens sent to Lambert, the Nepalese vernacular names of *M. simplicifolia* and *M. paniculata* and precise notes as to the colour of the petals of both of these species. In the case of *M. paniculata* this colour was given by D. Don in 1825 as yellow, and we know that this statement is correct. Yet in 1831 G. Don, when dealing with the same species†—we know that G. Don had his brother's specimens and no others in mind, because he speaks of the capsules as beset with imbricate bristles—described the flowers as either crimson or yellow, a statement which, as we have already seen, is contrary to our experience in any species of *Meconopsis*. Unless the statement were based on imagination—and this we have no right to assume—G. Don must have learned from some source other than his brother's work that there is in Nepal a *Meconopsis* with tall branching stems and red petals. The only possible source of such a statement was Wallich, who, at the time that Don's Dictionary appeared, was engaged in London in the distribution of the East India Company's collections. If the information as to there being a red-flowered *Meconopsis* in Nepal were correct, the statement could not apply to the tall species with branched stems, yellow petals, and adpressed-setose capsules, described by D. Don as *Papaver paniculatum*, and could only refer to the other tall species with branched stems and patently bristly capsules, described by De Candolle as *M. napaulensis*.

Having regard, however, to the uncertainty which has once more been created owing to the identification in the *Pflanzenreich* of the plant issued by Wallich as n. 8121, which is a co-type of *M. napaulensis*, DC., with the yellow-flowered species described by Hooker and Thomson as *M. robusta*, it seems advisable to await the receipt of further specimens of De Candolle's plant from its *locus classicus* in Central Nepal, and to obtain direct testimony as to the colour of its petals before definitely identifying it either with the yellow-flowered *M. robusta*, Hook. f. & Thoms., or with the red and blue-flowered *M. Wallichii*, Hook.

40. *Meconopsis napaulensis*, DC. Prodr. vol. i. p. 121 (1824); Prain in Journ. As. Soc. Beng., vol. lxiv. pars. 2. p. 317, quoad Wall. Cat. 8121 tantum (1896). *M. robusta*, Hook. f. & Thoms. Fl. Brit Ind. vol. i. p. 118 partim et quoad Wall. Cat. 8121 tantum (1872); Fedde, l.c., n. 269, partim et quoad Wall. Cat. 8121 tantum (1909). *Stulorhorum nepalense*, Spreng. Syst., vol. iv. cur. post. p. 203 (1827); Steud. Nomencl., ed. 2, vol. ii. p. 650, partim (1841). *S. paniculatum*, G. Don. Gen.

\* Prodrömus Florae Nepalensis, p. 197.

† General System of Gardening, vol. i. p. 135.

Syst. vol. i. p. 135 (1831), partim et quoad exempla floribus rubris prolata.

HIMALAYA: Central Nepal; Gossian Than, Wallich 8121.

The specimens of the gathering upon one of which *M. napaulensis* was based have leaves which agree in shape both with those of *M. robusta*, Hook. f. & Thoms., and with those of *M. Wallichii*, Hook. As regards their indumentum the specimens of *M. napaulensis* are almost exactly intermediate between those of *M. robusta* and *M. Wallichii*. The capsules of *M. napaulensis* approach much more closely to those of *M. Wallichii* than they do to those of *M. robusta*, to which latter species Wallich n. 8121 has been referred both in the *Flora of British India* and in the *Pflanzenreich*. There is reason to think that *M. napaulensis* may have red flowers, but owing to the fact that the evidence as to this is circumstantial and inferential, it seems desirable, until direct testimony as to the colour of its petals becomes available, to treat Wallich n. 1821 as a *tertium quid*, and to delay the acceptance of the consequences of the action taken by Hooker and Thomson in 1872, and endorsed by Fedde in 1909, in so far as regards the reduction of *M. robusta* to *M. napaulensis*.

It has to be remembered by those who use the *Pflanzenreich* not only that the plant on which the species *M. napaulensis*, DC. was based has in that work been transferred to *M. robusta*, Hook. f. & Thoms., but that elsewhere in the same volume *M. napaulensis*, DC., inadvertently written *nepalensis*, has been tentatively referred to another genus.\* *M. napaulensis*, Walp., which is not the same as *M. napaulensis*, DC., has in one passage in the *Pflanzenreich* been left as a synonym of *M. paniculata*, but has been cited afresh under *M. napaulensis*, DC., on the ground, explained in the second footnote on p. 269, that Walpers has not given a description of the species intended by him. This is the case, but the absence of a description by Walpers is due to the fact that no description was required. In 1825 Mr. D. Don, dealing with specimens of a *Meconopsis* from Nepal, sent by Dr. Wallich to Mr. A. B. Lambert, under the manuscript name *Polychaetia paniculata*, Wall., published a description of the species, which he referred to *Papaver* as *P. paniculatum*, at the same time imagining it to be the same thing as the plant published by De Candolle a year earlier under the name *Meconopsis napaulensis*. Dealing with the same problem in 1842, Walpers, who held the view that *Meconopsis* is a valid genus, accepted Don's description of the species as adequate, using as its name the synonym cited by Don and relegating the name used by Don to the position of a synonym.

41. *Meconopsis Wallichii*, Hook.: Journ. Hort. ser. 3, vol. xxxvii. p. 73, fig. 14 (1898); Fedde, l.c., p. 269, fig. 35 B (1909); Mottet in Rev. Hort. 1912, p. 204, figs. 63, 64 et icon. col.; Gard. Chron., 1912, vol. lii. p. 138 et 1913, vol. liii., fig. 66; Garden, 1915, p. 175 cum icon.

\* Das Pflanzenreich. 40 Heft [IV. 104], p. 211.

Var. **typica**; flores coerulei.

HIMALAYA: Sikkim; Tonglo, 10,000 ft., *Hooker* 42; *Kurz* 363; *Clarke* 27522: Phullaloong, 10,000 ft., *Clarke* 13,460. Chumbi; Sham-chen, *King's Collectors*. Bhutan; Dichu Valley, *Cummins*.

INDO-CHINA: Upper Burma; without precise locality, *Ward* 1907.

WESTERN CHINA: Western Szechuan; 12,000 ft., *Wilson* 3165.

This is the familiar Blue Poppy of Sikkim, the occurrence of which in China was reported by *Wilson* in 1904 (*Wilson* n. 3165). More recently it has been met with in Upper Burma by *Ward*, whose specimens were collected in 1914 (*Ward* n. 1907). The experience of the past ten years has definitely shown that it is not possible to treat this plant as specifically distinct from the red-flowered plant described and figured by Sir J. D. Hooker in 1884 as *M. Wallichii*, var. *fusco-purpurea*, Hook. f.,\* which in 1896, and again in 1906, was identified by the writer with *M. napaulensis*, DC.; the two forms have been found to originate from seed ripened on the same plant, and occasionally both red or purple flowers and blue flowers may occur on the same individual. At the same time the reduction of *M. Wallichii*, Hook., to *M. napaulensis*, DC., is still undesirable, owing to the re-acceptance in the *Pflanzenreich* of the view taken in 1872 in the *Flora of British India* with regard to the identity of *Wallich* n. 8121, which is a co-type of *M. napaulensis*, DC. In transferring the plant which actually is *M. napaulensis*, DC., to *M. robusta*, Hook. f. & Thoms., the *Pflanzenreich* has nevertheless retained the name *M. napaulensis* to designate *M. Wallichii*, var. *fusco-purpurea*, Hook. f. This usage cannot be adopted owing to the fact that the plant which forms the basis of *M. napaulensis* has been transferred by Dr. Fedde to another species, but, the action having been taken, it seem preferable for the present to maintain Hooker's variety, and thus to avoid further confusion in the synonymy of this red-flowered form.

Var. **fusco-purpurea**, Hook. f. Bot. Mag. t. 6760 (1884); flores rubro-fusci vel fusco-purpurei.—*M. napaulensis*, Prain in Journ. As. Soc. Beng., vol. lxiv. pars. 2, p. 317 (1896), et in Ann. Bot. vol. xx. p. 359 (1906), quoad syn. Hook. f. tantum; Fedde. l.c., p. 269, fig. 35 A (capsula juvenilis) 1909; Mottet in Rev. Hort. 1912, p. 204; Smith in Rec. Bot. Surv. India, vol. iv. p. 348 (1913).

HIMALAYA: Eastern Nepal; Thari, *King's Collectors*. Western Sikkim; Jongri, Tiamphung, *King's Collectors*; Eastern Sikkim; Chakung Chu, 11,000–12,000 ft., *Smith* 3962; *Ribu* 4465.

WESTERN CHINA: Western Szechuan; south-east of Mupine, 11,000–13,000 ft., *Wilson* 1152.

Since 1906 it has been found that this variety occurs in Eastern Sikkim as well as in Eastern Nepal and in the Western Sikkim

\* Erroneously cited by the writer as *rubro-fusca* in 1896 and again in 1906. This error has been corrected in the *Pflanzenreich*.





1. *M. NAPAULENSIS*; co-type. 2. *M. ROBUSTA*; type.



*Polychaeta*  
*sericea* Cole, Wall  
*leguminae* & *pro. prux*

*Polychaeta sericea* Cole

*Macropus* *Napaulensis* D.

Napaul

M. WALLICH  
 1821

1. *M. PANICULATA*; co-type.

2. *M. NAPAULENSIS*; type.

district of Jongri. More interesting still is the proof of its presence in China. This we owe to Mr. E. H. Wilson, who, during his journey of 1908, found in Western Szechuan the red-flowered form of the Sikkim Blue Poppy of gardens; the ordinary blue-flowered form he had already met with in the same province in 1904.

11. *CHELIDONIFOLIAE*, Prain, l.c., p. 364; Fedde, l.c., p. 270 (sect.).

42. *Meconopsis chelidonifolia*, Bur. et Franch.: Kew Bull. 1907, app. 3, p. 72; Fedde, l.c., p. 270, fig. 34 c (1909); Wilson, Western China, vol. i. pp. 127, 248 (1913); Journ. Hort. 1913, vol. lxvi. p. 149; Ball in Gard. Chron. 1914, vol. lv. p. 248.

This species has been introduced into European gardens through the Royal Botanic Garden, Glasnevin; it is perennial.

43. *Meconopsis Oliveriana*, Franch. et Prain: Fedde, l.c., p. 270 (1909).

This species has not yet been introduced to cultivation.

D. PRAIN.

#### EXPLANATION OF PLATES.

##### I.

Fig. 1. Photograph of specimen in Wallichian type herbarium, issued by Wallich in 1830 as n. 8121 "*Meconopsis e Gossain Than*." This specimen belongs to the same gathering as the original specimen of *Meconopsis napaulensis*, DC., published in 1824.

Fig. 2. Photograph of specimen in Wallichian type herbarium, issued by Wallich in 1830 as n. 8124 "*Meconopsis Kamaon*." This specimen is one of the types of *Meconopsis robusta*, Hook. f. & Thoms., published in 1855.

##### II.

Fig. 1. Photograph of specimen in Wallichian type herbarium, issued by Wallich in 1830 as n. 8123 "*Meconopsis B Napalia*." This belongs to the same gathering as the original specimen of *Papaver paniculatum*, D. Don [*Meconopsis napaulensis*, Walp. non DC.: *M. paniculata*, Prain], published in 1825.

Fig. 2. Photograph of specimen in the Prodromus herbarium, sent by Wallich to De Cándolle, which is the type of *Meconopsis napaulensis*, DC., published in 1824.

## XVIII.—*CORNUS NUTTALLII* AND ITS ALLIES.

W. J. BEAN.

(With Plates.)

There is a well-marked section of *Cornus* distinguished by its flowers being closely packed in a head, or capitulum, subtended by a showy involucre of four or more bracts. Four species belonging to this group are in cultivation:—*C. Nuttallii*, *C. florida*, *C. Kousa* and *C. capitata*: an excellent photograph of *C. Nuttallii* in full flower, lately received at Kew, is now reproduced. This, and the fact that several plants of the same species present in the collection at Kew have in recent years grown and flowered well, afford the opportunity for a few notes on this

beautiful group of cornels. It may be mentioned that these four species are divisible into two sections, geographically, and by the character of their fruits:—

1. Fruits densely packed in a capitulum, but free; *C. Nuttallii*, *C. florida*. (Subgenus *Benthamidia*, Spach.) North America.

2. Fruits agglomerated into a fleshy mass; *C. Kousa*, *C. capitata*. (Subgenus *Benthamia*, Lindley.) Asia.

**Cornus Nuttallii**, Audubon; Bot. Mag. t. 8311—The illustration we give of this, the noblest of cornels, enables us to appreciate the enthusiastic terms in which this tree is invariably commented on by writers and by travellers in Western North America. We are told that its beauty, both at the flowering season and in autumn when the foliage turns bright orange and scarlet, is so impressive that the tree is spared “even by the settlers.” The tree illustrated is by no means of exceptional size. Sargent gives the height as 40 to 60, occasionally 100, feet. Under cultivation in this country it is much more promising than its fellow American species—*C. florida*. At Kew some plants 6 to 10 feet high have flowered well for two or three years past. The inflorescence is formed in early autumn and remains exposed throughout the winter, the bracts developing and the flowers expanding the following May. The bracts usually number six, but vary from four to eight; they are 3 inches long and up to  $2\frac{1}{2}$  inches wide, often partially overlapping. The whole involucre (or “flower” as it is popularly termed) is thus 6 inches wide and creamy white often tinged with pink later. The true flowers are small, greenish, and gathered in a dense head  $\frac{3}{4}$  inch wide. The species is native of the coast region, from British Columbia and Vancouver Island to South California. We are indebted to Mr. F. W. Godsal, of Cowley, Alberta, Canada, for the photograph of a tree of *Cornus Nuttallii* growing in British Columbia which is here reproduced.

**Cornus florida**, L.; Bot. Mag. tt. 526, 8315 (*Benthamidia florida*, Spach.)—This beautiful small tree or shrub was in cultivation in the nursery of Thos. Fairchild, at Hoxton, as long ago as 1780, yet it has never become common in our gardens. Like so many other trees from Eastern North America, it finds something uncongenial in our climate—probably lack of sufficient sunshine in summer and autumn to ripen its wood thoroughly, together with late spring frosts that injure its young growths. It is perfectly capable of withstanding the severest winter cold we experience, as is shown by the healthy trees growing in the suburbs of Boston, Mass. It blossoms in May, the true flowers being inconspicuous and crowded in a head  $\frac{1}{2}$  inch wide. The beauty of the inflorescence lies in an involucre of four bracts, each bract being obcordate,  $1\frac{1}{4}$  to 2 inches long, 1 inch wide, white in the type, rosy red in var. *rubra* (Bot. Mag. t. 8315). The late Mr. B. E. C. Chambers was one of the most successful cultivators of *Cornus florida* and its variety in his garden at Haslemere, which, being elevated some hundreds of feet above sea-level and





CORNUS NUTTALLII.

[To face page 178.]



surrounded by valleys, escapes many of the late spring frosts from which low-lying localities suffer.

**Cornus Kousa**, Buerger (*Benthamia japonica*, Sieb. & Zucc.; *Cornus japonica*, Koehne).—For many years before the dispersion of the collections of trees and shrubs in Messrs. Veitch's nursery at Coombe Wood, a fine example of this Japanese cornel used to flower there charmingly in May and June. Our figure is of a spray cut from this tree. The bracts, four in number, are distinct from those of *C. florida* and *C. Nuttallii* in their ovate-lanceolate outline and long acuminate points; they are creamy white, 1 to  $1\frac{1}{2}$  inches long,  $\frac{1}{2}$  to  $\frac{3}{4}$  inch wide. As pointed out above, it differs from the two American species in its coalesced fruits which, in the aggregate, form a fleshy, strawberry-like mass. Introduced to cultivation originally from Japan, it is a native also of Corea and Central China. It reaches 20 feet or more in height.

**Cornus capitata**, Wallich (*Benthamia fragifera*, Lindl.; Bot. Mag. t. 4641).—At Kew this species can only be kept alive for any length of time by growing it against a wall, and even there it has rarely flowered. There are some very fine examples in Cornwall and in the South of Ireland. The tree was originally introduced from the Himalaya in 1825, and appears first to have been planted in the garden at Heligan, Cornwall. Some eight years later a plant flowered at Carclew, and upon it was founded the genus *Benthamia* by Lindley—after George Bentham, then secretary of the Royal Horticultural Society. Recent botanical opinion has put it back under *Cornus*, where it was originally placed by Wallich. Trees at Heligan are now over 40 feet high, also in Lord Barrymore's garden at Fota, near Cork, and probably elsewhere. They form a short thick trunk, the head of branches much wider than it is high. The bracts subtending each head of flowers are four to six in number and expand in July; they are of a beautiful pale yellow, obovate and  $1\frac{1}{2}$  to 2 inches long. Later, the fruits amalgamate into a fleshy, strawberry-like mass 1 to  $1\frac{1}{2}$  inches wide, and crimson, giving the trees a second season of beauty—often curtailed, however, by birds, which are fond of the fruits. Mr. Forrest has lately found *Cornus capitata* in S.W. China.

## XIX.—THE USES OF CORNUS WOOD.

W. DALLIMORE.

Although the importance of *Cornus* wood is not sufficient to exert a noticeable influence upon the timber market, that of several species is in regular demand, and the following notes indicate some of its uses.

The branches of most of the species, whether of shrubby or tree-like habit, are tough, and, when split longitudinally, they are used for hoops of barrels, but it is the species that form

distinct trunks that have the greatest economic value, and it is to them that these notes are specially directed.

**C. florida, L.**

The wood is heavy, hard, and close-grained, usually yellowish in colour when young but brown from old trees. It bears a resemblance to boxwood, and is sometimes used for wood-engraving. Its chief use, however, is for turnery, and it is employed for shuttles, spindles, cotton reels, tool handles, cogs of wheels, hubs of wheels, etc., whilst it also provides very good charcoal. It is imported into this country cut into blocks ready for shuttles and spindles, the ends of the blocks being covered with wax to prevent shakes or checks.

**C. Kousa, Buerg.**

Little is known of the timber value of this species, although the wood is not unlike that of *C. florida*. It is a native of Central China and Japan, where it is found as a small tree with a decided trunk. The wood could probably be used for turnery.

**C. macrophylla, Wall.**

This tree inhabits the forests of the Himalaya, China, Corea and Japan, and is frequently found from 40–60 ft. high with a trunk upwards of 12 in. in diameter. The wood has been used for cabinet work and turnery, and Gamble in "A Manual of India Timbers," p. 390, says that it "gives good gunpowder charcoal."

**C. Mas, L.—Cornelian Cherry, Cornel.**

Throughout the greater part of Europe and in certain parts of Western Asia this species is found wild, its place being taken in Eastern Asia by *C. officinalis*, Sieb. & Zucc., the two species being more distinct geographically than botanically. Under normal conditions they form small trees or large bushes 15–25 ft. high with trunks or main branches 6–9 ins. in diameter. The wood is used in Europe for hayforks, walking sticks, staves for ladders, tool handles (more particularly for picks and hammers), vine stakes, butchers' skewers, fuel and gunpowder charcoal. The young branches are very tough and are sometimes used for binding purposes in the same way as willow rods. As the wood is hard and close-grained it could be used for turnery; moreover, it takes a very good polish. The wood is pale yellow when young, the heart-wood of old plants being brown. A dye obtained from the wood was at one time used by the Turks for dyeing their fezes.

**C. Nuttallii, Audub.**

The wood is hard, strong, and fine-grained, the sap-wood creamy-white and the heart-wood brown. It is used for turnery, tool handles, mallets, cabinet-making, metal spinners' forms and for other purposes. A section in Museum No. 1, at Kew, is prettily marked.

**C. sanguinea, L.—Dogwood, Hounds'-tree, Prickwood.**

This is the common dogwood of Europe and N. and W. Asia. It is found wild in the British Isles, and usually grows in bush



form from 6-18 ft. high. The branches are sometimes 6-9 in. in diameter, and the close-grained yellowish wood bears a striking resemblance to boxwood. The wood is not in regular use, although it has been employed for gunpowder charcoal, either pure or mixed with wood of *Rhamnus Frangula*. It is also used for cogwheels, walking sticks, butchers' skewers, and toothpicks. From the two latter uses the common name of prickwood originated. The common names of hounds'-tree and dogwood are said to have occurred by reason of a decoction of the bark being used for washing mangy dogs. It appears probable that both this species and *C. Mas* might be profitably employed under coppice conditions for walking sticks and gunpowder charcoal.

## XX.—MISCELLANEOUS NOTES.

We learn that Mr. S. C. HARLAND, B.Sc., has been appointed Assistant Agricultural Superintendent, St. Vincent, in succession to Mr. F. Birkinshaw, transferred to Mauritius (*K. B.*, 1914, p. 227).

DR. R. E. FRIES AND THE BERGIELUND BOTANIC GARDEN.—The recent announcement of the appointment of Dr. Klas Robert Elias Fries as Director and Professor at the Bergielund Garden demands notice. He is a son of Prof. Thore Magnus Fries (1832-1913), who was Professor of Botany in the Royal University of Uppsala from 1877 to 1900, and grandson of Elias Magnus Fries (1794-1878), the brilliant expositor of the Fungi, termed by Sir Joseph Hooker, the "Father of Mycology."

He has travelled in South America and published extensively on his collections, chiefly from the Argentine, and has worked out many of Regnell's plants. Since 1905 he has been *Docens* (Lecturer) in Botany in his University.

Bergielund, a name bestowed by its founder, otherwise known as Hortus Bergianus, and in Swedish as Bergiansk Botaniska Trädgården, is situated at Albano, a short distance to the north-west of Stockholm. It was bequeathed to the Royal Academy of Science by Peter Jonas Bergius (pron. Bäre-yūs), who died in 1790, aged 60. He had been a pupil of Linnaeus, and was author of "Descriptiones plantarum ex Capite Bonae Spei," 1767. The bequest took effect in 1791, and the Academy became possessed of a garden devoted in perpetuity to horticulture and botany, of about 17 acres in extent, together with a library of 5,000 volumes, an herbarium of 9,000 species in 15,632 sheets, and the largest part of the testator's estate.

The Academy appointed Olof Swartz (1760-1818) as the first Professor and Director; on his death he was succeeded by J. E. Wikström (1789-1856), in turn followed by Nils Johan Andersson (1821-1880). The last-named retired from ill-health in 1879, and was succeeded by Veit Brecher Wittrock, whose labours and success in establishing the "Acta horti Bergiani" are widely known and appreciated. His recent death is much deplored.

An interesting incident connected with this establishment was the gift in 1808 of £250 by Sir Joseph Banks, Bt., P.R.S., the income to increase the professorial stipend, but with the proviso that the annual return should be enjoyed during life by Fru A. M. Idman, a relative (married sister?) of Daniel Solander, Banks's fellow-traveller and afterwards his librarian.

The lady died in the same year, 1808, so the increment came at once to augment Swartz's modest salary.

B. D. J.

**Trees and Shrubs Hardy in the British Isles.\***—The need of a comprehensive descriptive work upon hardy trees and shrubs has long been felt, for although certain groups have been dealt with fairly completely from time to time, there has been nothing to take the place of Loudon's great work published between 70 and 80 years ago and now hopelessly out of date. The book under notice, however, fills the want, and is likely to remain the standard work upon hardy woody plants for many years to come.

The new book is by Mr. W. J. Bean, the Assistant Curator of the Royal Botanic Gardens, Kew, whose long connection with the Kew collections and complete knowledge of everything connected with arboriculture have peculiarly fitted him for the work. The late Mr. G. Nicholson contemplated a revision of Loudon's book had not failing health put a stop to all serious work, and in some quarters an idea has prevailed that Mr. Bean's book was being prepared upon similar lines. But a comparison of the two books shows that there is nothing in common between them except the thoroughness of the authors.

The work is divided into two volumes, the first containing 688 pages and the second 736 pages. The first volume commences with chapters upon various operations connected with the culture of trees and shrubs and lists of subjects suitable for various soils and positions, and concludes at page 110 with a glossary of botanical terms. In this part are found chapters upon such subjects as propagation, hybridising and selection, nursery work and methods, transplanting, soils and mulching, arrangement of shrubberies, staking or other means of support, pruning trees and shrubs, climbing shrubs, pendulous trees, fastigiate or erect-branched trees, dwarf trees and shrubs, trees and shrubs with handsome fruits, handsome-barked trees and shrubs, variegated and coloured trees and shrubs, fine-foliaged trees and shrubs, autumnal colour in trees and shrubs, early- and late-flowering trees and shrubs, street planting, hedges, trees and shrubs for wet places, shrubs for dry positions and poor soils, shrubs in shady places, seaside planting, and an excellent and exceedingly interesting opening chapter entitled historical notes. From page 111 of the first volume to the end of the second volume the space is given over to a descriptive list of genera and species, except for some 40 pages at the end, which are required for an index.

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\* "Trees and Shrubs Hardy in the British Isles." By W. J. Bean, Assistant Curator, Royal Botanic Gardens, Kew. London: John Murray; 2 vols., price 42s. net.



The genera are arranged alphabetically, and a systematic method of description obtains throughout. In the first place, a general description of the genus is given, followed by descriptions of the important species with any special cultural remarks that may be necessary. The following description of *Betula lenta* is typical of the descriptions of species throughout the work, except that whenever possible a reference is given to a figure of the plant, and important synonymous names are inserted when such exist and are likely to cause confusion.

“*B. LENTA*, *Linnaeus*. BLACK OR CHERRY BIRCH.

A tree up to 70 or 80 ft. high in a wild state; the bark of the trunk not peeling, dark, almost black; young shoots silky-hairy when very young, soon becoming smooth and shiny brown. Leaves ovate or ovate-oblong, mostly heart-shaped at the base, pointed,  $2\frac{1}{2}$  to 6 ins. long,  $1\frac{1}{2}$  to  $3\frac{1}{2}$  ins. wide, toothed (often doubly so), dark glossy green and ultimately smooth above, paler green and silky-hairy on the mid-rib and veins beneath; veins in ten to thirteen pairs; leaf-stalk  $\frac{1}{4}$  to 1 in. long, hairy. Male catkins 2 to 3 ins. long. Fruiting catkins 1 in. or rather more long,  $\frac{1}{2}$  in. in diameter, scarcely stalked; scales not downy, the lateral lobes rather wider than the middle one.

Native of Eastern N. America, where it yields a valuable timber; introduced in 1759, according to Aiton. When bruised, the young bark has a sweet, aromatic taste and smell, and by distillation yields an aromatic oil. This birch is allied to *B. lutea*, but differs in the darker bark of the trunk, the sweeter-tasted young bark, and especially by the smooth scales of the fruit catkin. In my experience it is not so well-doing a tree as *B. lutea* in this country.”

From such a description a person who is quite ignorant regarding the species can form a good idea of its general character and peculiarities, whilst the technical terms used are such as can be readily understood.

In addition to descriptions of the older trees and shrubs being given, attention has been paid to new introductions, and a large number of plants introduced to European gardens within the last 15 years are well described.

The work is well illustrated by full-page photographs by Mr. E. J. Wallis and by line drawings, made from photographs, by Miss E. Goldring. The publisher is Mr. J. Murray, and both author and publisher are to be congratulated upon the production of such a valuable and long desired book.

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\* **Wild Rubber and Selection.**—Dr. Cramer of Buitenzorg, in a paper under this title, gives some useful hints to growers on the selection of *Hevea*. This subject, he points out, has been neglected, or at any rate undertaken on wrong lines. The selection of *Hevea* should commence with the seed-bearers, and not be entirely confined to the seeds or the seedlings. According to the author's personal observations of both wild and cultivated

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\* Dr. P. J. S. Cramer in International Rubber-Congress Met Tentoonstellng, Batavia, 1914—Rubber recueil.

trees, considerable variation occurs in the shape and size of the seeds from different examples, and also in the productiveness of wild trees, among which "barren" individuals are sometimes found. Dr. Cramer gives reproductions of photographs of a series of seeds from trees of *H. brasiliensis* growing in the same localities in Brazil, which show striking variation in size. The impossibility of determining critical species from seeds alone is evident from the author's remark that "the difference in [seed] characters in *Hevea Randiana* (a closely allied species) and *H. brasiliensis* is less marked than may occur between the seeds of two trees of true *brasiliensis*."

The wild trees observed by Dr. Cramer were all from the lower reaches of Brazilian rivers, which often overflow their banks at high tide, and he suggests an interesting explanation of the cause of marked differences which are shown in adjacent trees in such localities. Frequently seeds may be observed floating down the rivers from the upper reaches, and these become stranded in quiet corners of the banks, where they form a layer on the water. At high tide they are immediately transferred to a considerable distance on the adjoining banks, where they germinate. Therefore many of the trees now growing in the lower reaches of Brazilian rivers are really the direct offspring of upper region types, and thus a mixture of the two races has been brought about.

Part 5 of the paper deals with experiments on seedlings and tables and photographs are given showing their relative variation from different stocks.

In part 6, Dr. Cramer points out that, according to the late Dr. Huber, the Tapajoz region of Brazil where Wickham obtained his seeds, is not the place from which the best rubber is at present obtained, and as nearly the whole of the East India plantations have been stocked from seeds gathered in this region, it is therefore assumed that the quality of the rubber is not so good as it might have been had the first seeds been gathered in the Acre district of the up-river regions, *i.e.*, on the Beni and other tributaries of the Upper Madeira and Purús rivers, where the best rubber is at present obtained. There is, however, no indication that this rubber is superior to that which used formerly to be collected in the Tapajoz region.

The question is discussed as to whether this Acre or up-river *Hevea* may be a distinct variety or subspecies of *H. brasiliensis*, as is the general belief in Brazil, and Dr. Cramer is himself inclined to this opinion.

It should be noted that Dr. Cramer's work on *Hevea* selection so far concerns the character of the seedlings only, and it remains to be seen whether the young plants showing the most vigorous growth will prove to give the greatest yield of latex.

Dr. Cramer's interesting contribution concludes with notes on the practical importance of careful choice of the best producing varieties of other agricultural crops, citing as examples the advantages which have accrued from the introduction of *Cinchona Ledgeriana*, with a bark richer in quinine than the older *C. officinalis*, the replacement by Assam instead of the old China tea, and the revival of the coffee cultivation in Java by the advent of *Coffea robusta*.

J. H.